AIRBORNE H.F. EQUIPMENT
MODEL AT-144 TRANSMITTER
(CAATC #2R3-4)
MODEL DFU POWER UNIT
(CAATC #2R3-3)

APR 13 1959

AER-O-COM

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3090 S. W. 37 AVENUE, MIAMI 33, FLA., U. S. A.

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AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,
(AEROCOM)
3090 S. W. 37th Avenue
MIAMI 33, FLORIDA
U. S. A.

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INSTRUCTIONS

MANUFACTURED BY:

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,

3090 DOUGLAS ROAD,

MIAMI 33, FLORIDA.

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INSTRUCTIONS

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AIRBORNE H.F. EQUIPMENT
MODEL AT-144 TRANSMITTER
(CAATC #2R3-4)
MODEL DPU POWER UNIT
(CAATC #2R3-3)

DRAWING LIST

B-~~1057~~ 1362-A	AT-144/AAT/DPU Interlocking Control Circuits
A-886	AT-144 Outline
A-887	DPU Outline
D-953	AT-144/DPU/AAT Interconnections
DPU #16	DPU Schematic
A-1038	DPU Parts List (Electrical)
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AT-144 #61	Band Solenoid Assembly Circuitry
AT-144 #64	Drum Control Assembly Circuitry
AT-144 No. P-119	Parts Location - Front View, Covers On
AT-144 No. P-120	Parts Location - Front View, Covers Off
AT-144 No. P-121	Parts Location - Top View, Covers Off
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AT-144 No. P-123	Parts Location - Right Side View, Covers Off
AT-144 No. P-124	Parts Location - Bottom Side View, Covers Off
AT-144 No. P-125	Parts Location - R.F. Exciter-Oscillator Section, Z1
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AT-144 No. P-127	Parts Location - R.F. Exciter-Bottom View of Tube Shelf, Z1
AT-144 No. P-128	Parts Location - Buffer Plate and Coil Assembly
AT-144 No. P-129	Parts Location - P.A. Tuning and Load Capacitor Assembly
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AT-144 #161	Power Output and Band Coverages
AT-144 #156	Overall Fidelity
AT-144 #151	AT-144 Block Diagram
AT-144 #169	AT-144 Bandswitch Orientation
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AT-144 #147	AT-144 Wiring Diagram
AT-144 #140	AT-144 Power Resistors Wiring
AT-144 #138	AT-144 Control Relay Assembly Wiring
AT-144 #154	AT-144 Wire List
AT-144 #148	AT-144 Overall Schematic Diagram

AIRBORNE H.F. RADIO TRANSMITTER MODEL AT-144 (CAATC #2R3-4) AND COMPANION POWER UNIT MODEL DPU (CAATC #2R3-3)

MANUFACTURED IN ACCORDANCE WITH ARINC CHARACTERISTICS NOS. 522 (TRANSMITTER), 523 (POWER UNIT) AND 524 (SELECTOR SYSTEM)

I. GENERAL:

The AT-144 is an Automatic Tuning, H.F. Radio Telephone/Telegraph Transmitter which requires only the insertion of a crystal (in front panel mounted drum) to set up a new frequency. Provision is made for 144 crystals and these may be installed in any desired frequency arrangement, since the transmitter tunes automatically to each crystal frequency as it is selected by the remote frequency selector switch. Provision is also made for excitation by means of an external RF source.

The average level of speech modulation is unusually high (without over-modulation) due to the use of higher speech amplifier sensitivity plus audio clipping.

II. POWER SUPPLY:

The AT-144 Transmitter, together with companion DPU Power Unit, operates from a nominal 27.5 volt D.C. supply. (The companion Automatic Antenna Tuner, Model AAT also operates from a nominal 27.5 volt D.C. supply; instructions covering this Automatic Tuner are contained in a separate manual).

No A.C. power is required for any of the units.

The total current requirements at 27.5 volts D.C. are tabulated below:

Condition	AT-144 & DPU	AAT	Total
Standby	3.3	1.0	4.3 Amp
Tuning	30.	1.1	31.1 Amp
Transmitting	36.	1.2	37.2 Amp

III. FREQUENCY RANGE - CRYSTAL DATA - POWER OUTPUT:

The AT-144 Transmitter covers the frequency range: 1.6 - 1.75 and 2.0 - 22.0 Mcs. Each frequency is determined by a fundamental, low drift (.005% operating tolerance) plated quartz crystal in Type HC-6/U holder. The crystal frequency is always the same as carrier frequency.

Proper correlation is obtained by using either the AT-144 Transmitter, or a correlation oscillator supplied by AEROCOM.

III. FREQUENCY RANGE - CRYSTAL DATA - POWER OUTPUT (Continued):

Nominal carrier power output is 100 watts into a 52 ohm resistive load. Actual carrier power output and frequency coverage for the 8 bands is shown on Drawing AT-144 #161, for a typical transmitter. Following is a tabulated list of nominal band coverages:

Band	Freq. (Mc)	Band	Freq. (Mc)
1	1.6 - 1.75	5	4.5 - 6.0
2	2.0 - 2.55	6	6.0 - 9.5
3	2.55- 3.3	7	9.5 -15.5
4	3.3 - 4.5	8	15.5 -22.0

It is important to note that manual selection of any band is NOT made when installing a new crystal; the transmitter automatically finds the correct band and then resonates all circuits properly, after a certain crystal has been selected by the remote frequency selector switch.

IV. TUNING TIME:

Since the transmitter always starts searching (for a certain final amplifier grid current) first in the lowest frequency band (1.6 - 1.75 Mc), it follows that the tuning time is minimum for frequencies in band 1 (1.6 - 1.75 Mc) and maximum for frequencies in band 8 (15.5 - 22 Mc).

The tuning time for any one band varies about 2 seconds depending on whether the crystal drum rotates a full turn or whether it does not rotate. Therefore, the tuning time is approximately 3 to 5 seconds for frequencies in band 1 and increases slightly less than 1 second per band, so that it is about 7 to 9 seconds for frequencies in band 8.

V. TUBE COMPLEMENT, AT-144 TRANSMITTER (NOTE: NO TUBES ARE USED IN THE DPU POWER UNIT):

1	5654	Crystal Oscillator
1	6146	RF Amplifier
1	6146	Buffer
2	4-65A	Final Amplifier
2	811-A	Modulator
1	5654	Speech Amplifier
1	5726	Speech Clipper
1	6005	Audio Driver

VI. INSTALLATION DETAILS:

Drawing A-886-3 shows outline and mounting dimensions, weight, and approved shockmount types for the AT-144 Transmitter.

Drawing A-887-3 shows outline and mounting dimensions, weight, and approved shockmount types for the DPU Power Unit.

VI. INSTALLATION DETAILS (Continued):

Each unit should be mounted on an approved type shock mount or an approved shock mounted shelf. When mounted directly on a shelf, care must be taken to allow at least 1/2" clearance between bottom of transmitter and shelf, to permit proper air intake for cooling. This is covered by Note 3 on Drawing A-886-3.

When individual shock mounts are used, adequate spacing from adjacent units or members must be used to prevent equipment striking such adjacent items with maximum excursion of the shock mount. Using a conventional shock mount, space should be allowed for a sidewise movement of ±1" at the top of the DPU Power Unit, and ±3/8" at the bottom; also ±3/8" endwise and vertically.

For the AT-144 Transmitter, space should be allowed for a sidewise movement of ±1/2" at the top and ±3/8" at the bottom; also ±3/8" endwise and vertically.

Drawing D-953-8 shows electrical installation details for AT-144 Transmitter, DPU Power Unit and AAT Tuner. This drawing also shows type and orientation of plugs for external connections on each of the 3 units.

VII. OPERATION:

It is assumed that the Transmitter, Power Unit and Antenna Tuner have been properly mounted, and interconnected as shown on Drawing D-953-8; also that necessary remote controls have been provided as shown on Drawing D-953-8.

A set of tubes must be installed in both the Transmitter and the Antenna Tuner (the DPU Power Supply uses no tubes).

CAUTION: Before installing Type 4-65A tubes, check the pins and be sure the ends are rounded and smooth. Some of these tubes have been manufactured with ends of pins cut off square or beveled; when these are pushed into the socket, there is a tendency for the pins to dig into the socket contacts, and if sufficient pressure is used, one or more of the contacts may be bent downward, thus necessitating replacement of the complete socket.

The time delay relay TD-1 must be plugged into its socket near the front of the transmitter. (This relay prevents the tuning mechanism and dynamotor from operating until one minute after application of primary battery voltage to the equipment). Other plug-in items include Relay K4 in the AT-144 Transmitter, and Vibrator VB1 in the DPU Power Unit. Fuses must be installed.

Crystals of required frequencies must be installed in the aluminum drum at the front of the transmitter (this drum is exposed by releasing 2 Dzus fasteners and then removing the cover on the front of the transmitter). It will be noted that the slots to accept the crystals are numbered 1 through 24 around the drum (numbers seen when looking down into top of drum); and the six rows of slots are lettered A, B, C, D, E, F (with A the top row and F the bottom row).

With 28 volt power removed from the transmitter, the crystal drum can be turned manually to any desired position (for removal or installation of crystals) by pushing to the right the 3/16" diameter shaft carrying the worm which engages

VII. OPERATION (Continued):

with the worm wheel on the drum shaft. The worm shaft is spring loaded, and pushing it to the right will disengage the worm from the worm wheel. CAUTION: If the drum is turned manually with 28 volt power ON, the tuning cycle will be started and the drum will be rotated (by motor) to the position on which the remote selector switch is set.

If the wiring to the remote frequency selector switch has been made properly, then the settings of the two sections of the switch will correspond with the crystal position selected in the transmitter; for example, if the remote selector switches are set on "24" and "A", then the crystal installed in slot "24A" of the drum will be selected.

For voice operation, use a single button carbon microphone (anti-noise type), with press-to-talk switch and connect as shown on Drawing D-953-8.

For CW telegraph operation, connect dynamotor start switch and telegraph key as shown on Drawing D-953-8.

VIII. PHYSICAL, AT-144 TRANSMITTER:

Drawing A-886-3 shows outside dimensions and weights. Drawings (Photos) Nos. P-119 through P-130 show location of all parts.

The transmitter parts are assembled on a bent up, welded aluminum chassis with front and rear aluminum panels attached thereto and supported at the top corners with two lengths of aluminum angle.

Instead of a case, the sides and bottom are attached with screws and the top is attached with Dzus fasteners. Access to all of the tubes, as well as most circuit items mounted on top of the chassis, is obtained by removing the top cover.

Access to the crystal drum is obtained by removing the rectangular dust cover on the front of the transmitter, this cover being held in place with two Dzus fasteners. Upon removing this cover, the crystals can be removed or installed using only a screw driver.

IX. PHYSICAL, DPU POWER UNIT:

Drawing A-887-3 shows outside dimensions and weight. Drawings (Photos) DPU Nos. P-21-A, P-21-B and P-21-C show location of all parts.

The assembly consists of a bent up, welded aluminum chassis with vertical aluminum panel attached at the front end. All parts are attached to the chassis or front panel.

The dynamotor is mounted directly to the chassis, using suitable mounting angles. The vibrator bias power supply components together with three large oil filled capacitors are mounted on the chassis immediately behind the front panel; circuit breaker/switch and dynamotor start relay are attached to the front panel; a dust cover is used over these items and is held in place with machine screws.

IX. PHYSICAL, DPU POWER UNIT (Continued):

The low voltage (+27.5 volt DC) fuse and spare are located on the front panel. The high voltage (+1150 & +400 volt DC) fuse and spare are located at the top rear of the main chassis.

X. ELECTRICAL - DPU POWER UNIT:

The DPU Power Unit supplies to the AT-144 Transmitter a bias voltage of 110; also plate voltages of 400 and 1150.

The bias voltage is generated by a hermetically sealed vibrator (VB1), together with transformer (T1), selenium disc rectifiers (CR1) and filter (R4 and C9).

The plate voltages of 400 and 1150 are supplied by a dynamotor.

Schematic diagram is shown on Drawing DPU #16-2.

Parts list is covered on Drawing A-1038-1.

Relay windings and bias supply components are protected with a 1.6 amp fuse (F1). Protection for the dynamotor is provided by a primary 40 ampere switch/breaker (DB1). High voltage circuit protection (+1150 & +400 V DC) is provided by a 1 ampere quick-acting fuse (F3).

XI. ELECTRICAL - DESCRIPTION:

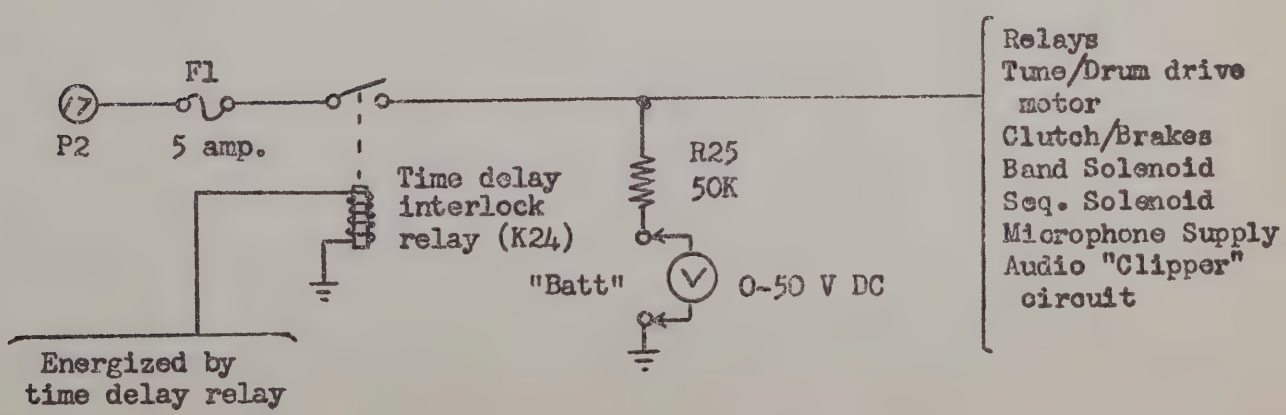
Drawing No. AT-144 #149 covers schematic of Control Circuitry.
Drawing No. AT-144 #150 covers schematic of RF and Audio Circuitry.
Drawing No. AT-144 #152 covers Parts List (Electrical).

A. POWER SUPPLY CIRCUITS:

(1) +27.5 volts D.C.

The +27.5 volts D.C. input to the transmitter is supplied from the aircraft +27.5 volt supply and consists of two circuits ("Controls" and "Filaments").

(a) "CONTROLS". Following is a simplified AT-144 Transmitter "Controls" circuit diagram (Note: All circuit designators refer to the AT-144)

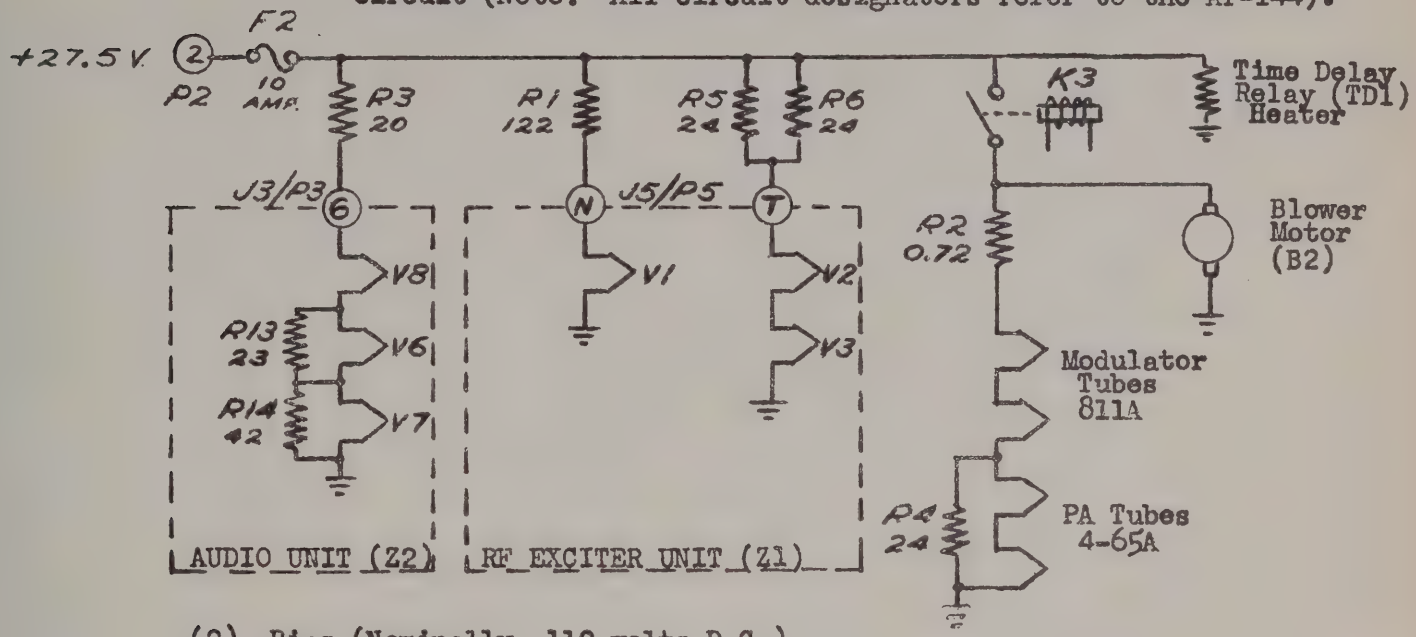


XI. ELECTRICAL - DESCRIPTION (Continued):

A. POWER SUPPLY CIRCUITS (Continued):

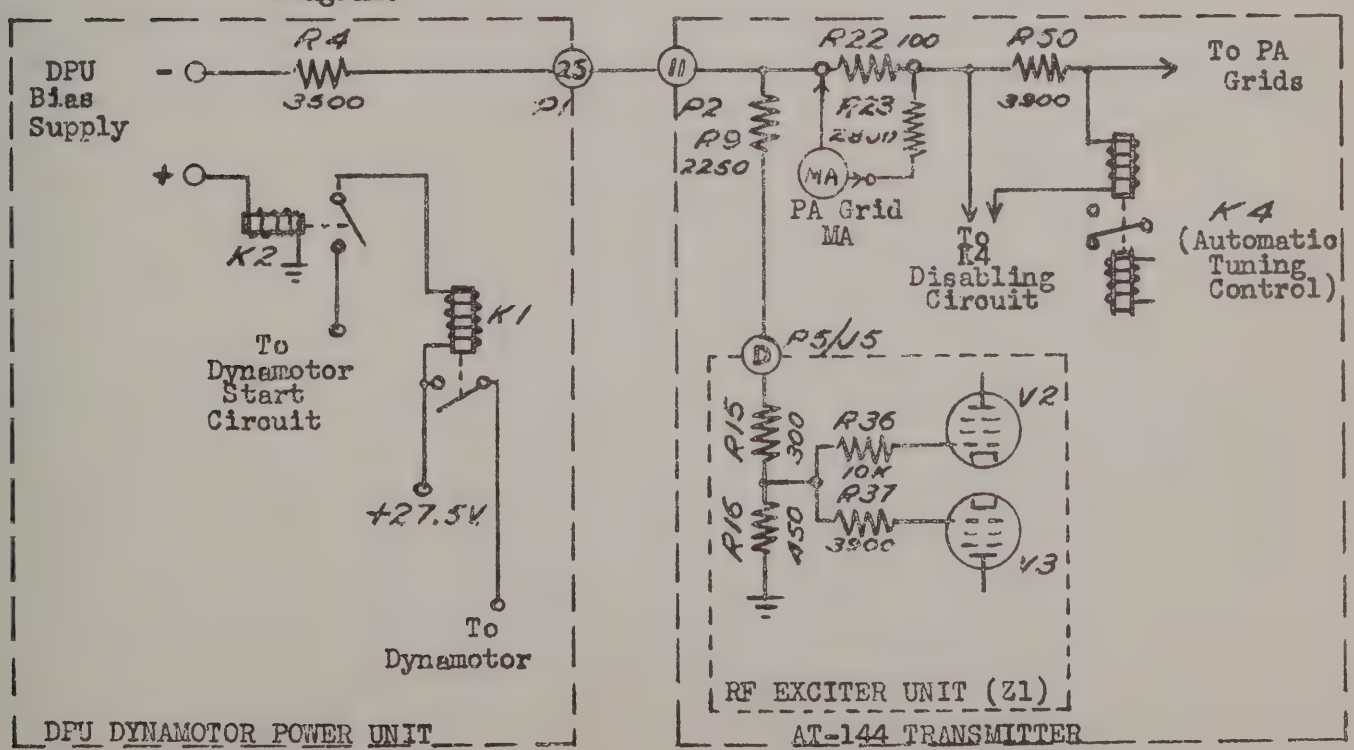
(1) +27.5 volts D.C.

(1) (b) "FILAMENTS". Following is a simplified AT-144 "Filaments" circuit (Note: All circuit designators refer to the AT-144).



(2) Bias (Nominally -110 volts D.C.)

The bias voltage for the AT-144 Transmitter is supplied by the DPU Power Unit. Following is a simplified DPU/AT-144 Bias Circuit diagram:

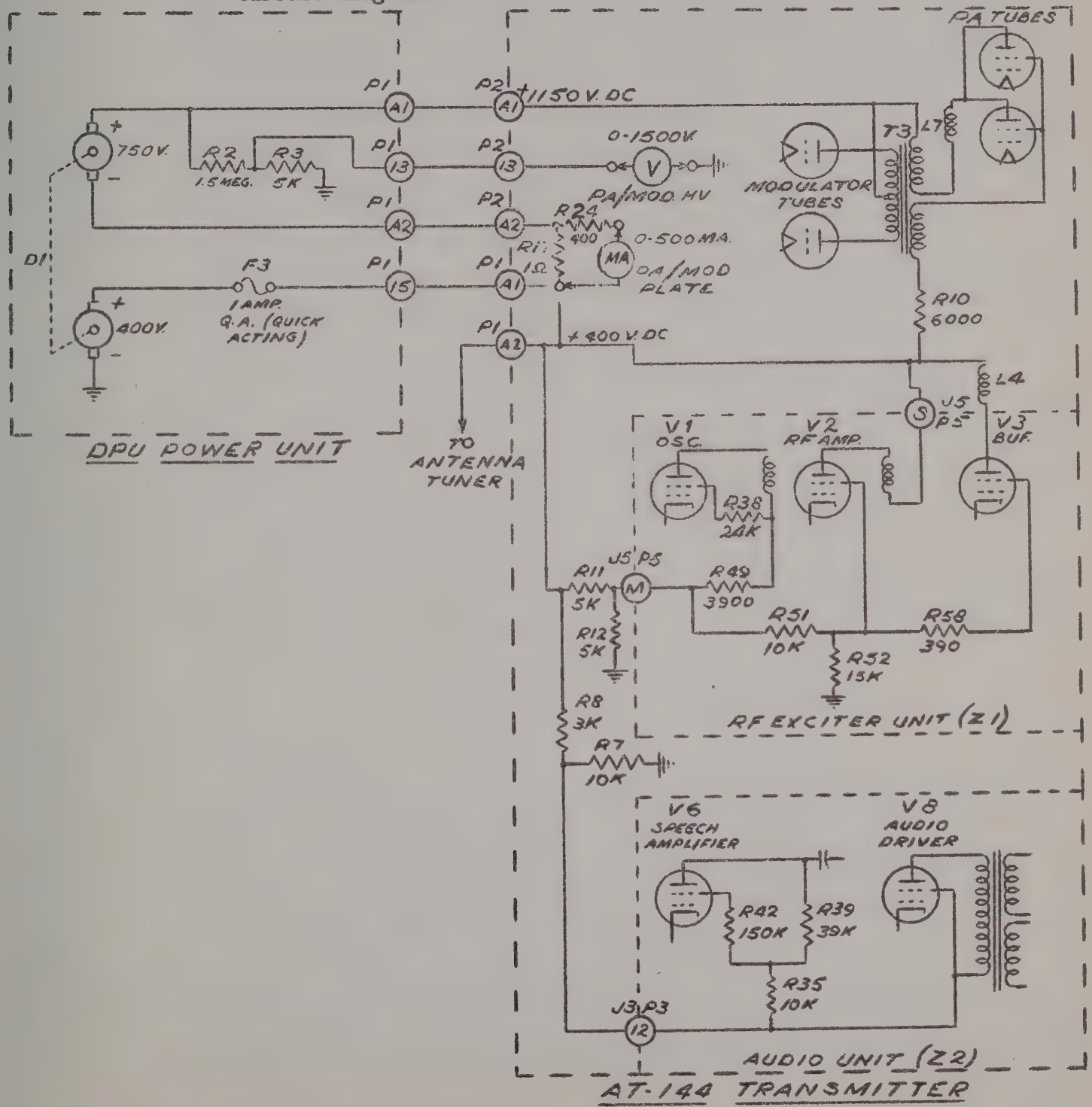


XI. ELECTRICAL - DESCRIPTION (Continued:

A. POWER SUPPLY CIRCUITS (Continued:

(3) HV (+400V and +1150 V DC)

The High voltage (HV) for the AT-144 Transmitter is supplied by the DPU Power Unit. Following is a simplified DPU/AT-144 HV circuit diagram:



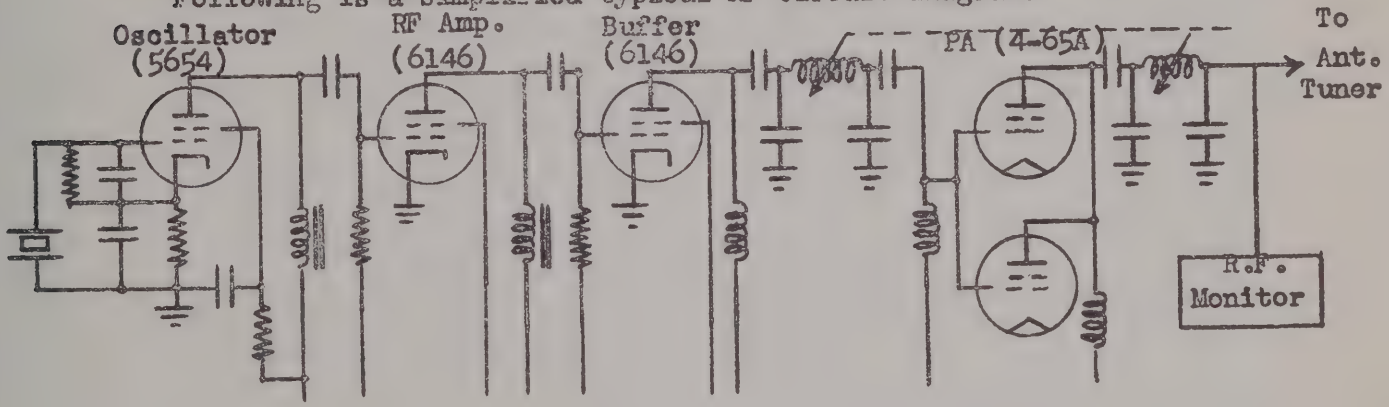
XI. ELECTRICAL - DESCRIPTION (Continued):

B. RF CIRCUITS

The RF portion of the transmitter consists of a 5654 crystal oscillator driving a 6146 RF amplifier which in turn drives a 6146 buffer followed by the final amplifier which consists of two Type 4-65A's in parallel. The plate circuits of the oscillator and RF amplifier use broadly tuned, low "Q" circuits to cover the frequencies in each of the eight bands. Specifically, the oscillator uses a resistor for bands 1, 2, 3 and 4, and four low "Q" inductors for bands 5, 6, 7 and 8. The RF amplifier uses an "R.F. Choke" as an inductor for bands 1, 2 and 3, and five low "Q" inductors for bands 4, 5, 6, 7 and 8. The buffer plate tuned circuit is a capacitively coupled shunt type circuit on bands 1, 2, 3, 4 and 6 and is a capacitively coupled π type circuit on bands 5, 7 and 8. The PA plate is coupled to the 52 ohm transmission line by means of a π type circuit on all bands.

An RF monitor (located electrically at the transmitter RF output) provides audio sidetone as well as a D.C. meter indication of RF output voltage (with transmitter meter switch at "RF OUT" position).

Following is a simplified typical RF circuit diagram:



C. AUDIO CIRCUITS

The audio section of the transmitter consists of a 5654 speech amplifier, the grid of which is driven from the secondary of transformer T1; the primary of this transformer obtains speech currents from a single button carbon microphone; it will be noted that a 250 K ohm potentiometer is installed across the secondary T1 with the slider being connected to the #1 grid of the 5654 speech amplifier, thus providing a means of adjusting the overall sensitivity of the audio system.

The plate of the 5654 speech amplifier feeds the #1 grid of driver tube 6005 through a low pass filter consisting of two inductors L1 and L2 together with their associated fixed capacitors; this network is adjusted to provide rapidly increasing attenuations for audio frequencies above 3500 cps.

XI. ELECTRICAL DESCRIPTION (Continued):

C. AUDIO CIRCUITS (Continued)

The plate circuit of the 5654 speech amplifier tube is shunted with the two diodes contained in the 5726 vacuum tube; those diodes together with their associated resistors, serve to clip the voltage peaks in the plate circuit of the 5654 amplifier and thus prevent over-modulation. The correct point of clipping is established by means of the 2000 ohm variable potentiometer (R21) associated with the 5726 tube. This arrangement permits the use of relatively high gain in the speech amplifier, resulting in a high average modulation level, without danger of over-modulation.

The plate of the 6005 driver tube feeds the grids of the two 811A modulator tubes through transformer T2. The plates of two 811A modulator tubes provide high level modulation to the final RF amplifier plates through modulation transformer T3; it will be noted that one winding on this transformer supplies modulating voltage to the plates of the final RF amplifier while another winding supplies voltage to the #2 grids of these tubes.

D. CONTROL CIRCUITS:

1. SELECTOR SYSTEM. (See Drawing AT-144 #170)

The AT-144 frequency selector system conforms to ARINC characteristic No. 524 "AIRBORNE HF COMMUNICATIONS SELECTOR SYSTEM", System No. I. This system requires at the control point a dual concentric selector switch which functions as follows:

(a) Outer switch (24 position). This switch is used to control the position at which the transmitter crystal drum stops. This is accomplished by means of a re-entrant type circuit using six wires plus a common return.

(b) Inner Switch (6 positions required for crystal selection plus a 7th position for "External" excitation, if desired). The first 6 positions of the switch are used to complete the circuit to one of the transmitter crystal pickup relays (K5-K10) which in turn connects the corresponding crystal to the oscillator (V1) grid. The seventh position may be used to complete the circuit to the transmitter "External Frequency Control" relay K2 which in turn connects the external excitation source to the grid of V1, through a coupling capacitor.

2. RE-CHANNEL AND INTERLOCKING.

The AT-144 transmitter re-channels when the following occur:

(a) Change in position of the outer wafer on the remote selector switch (corresponding to selection of a different crystal drum position).

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

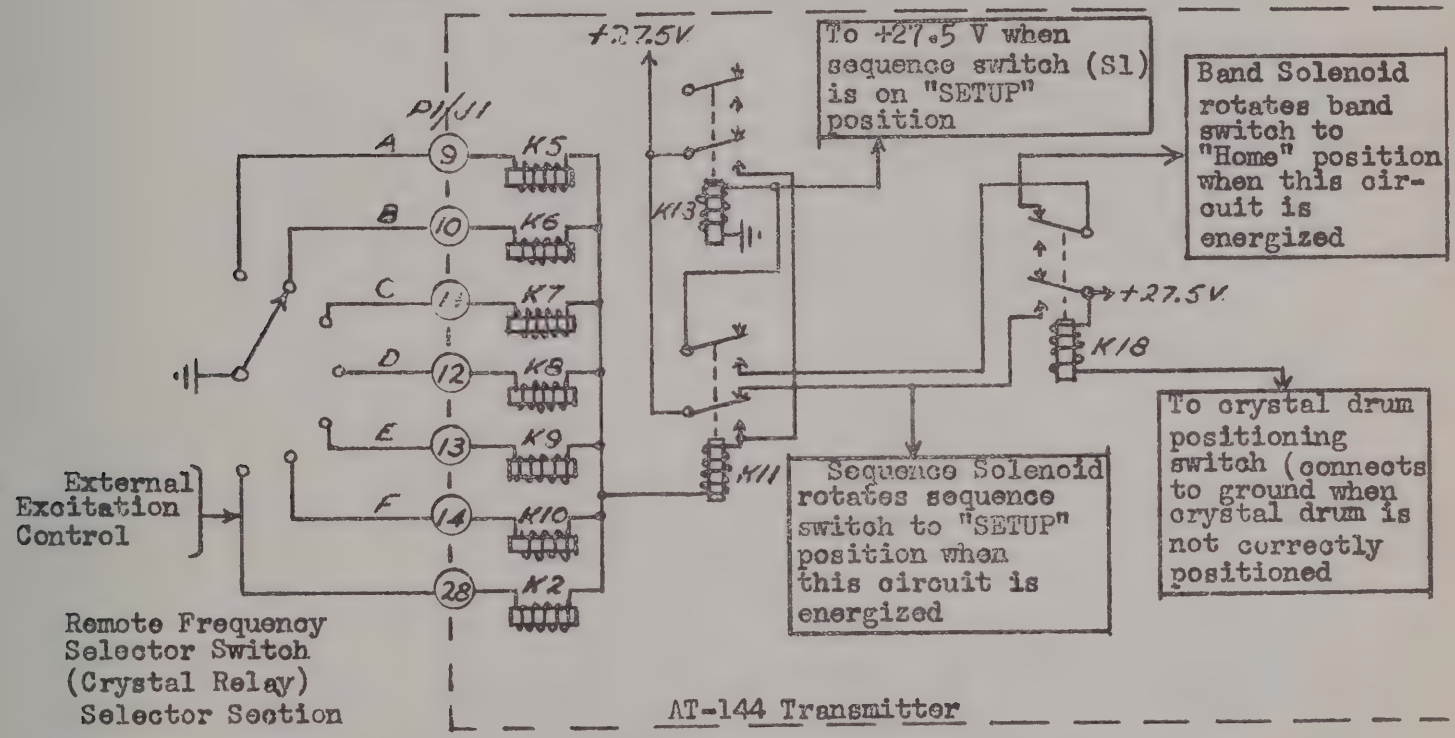
2. RE-CHANNEL AND INTERLOCKING. (Continued)

(b) Change in position of the inner wafer on the remote selector switch (corresponding to selection of a different crystal bank on the crystal drum).

(c) Removal of power to the AT-144 +27.5 volt DC "Control" circuit.

The re-channel cycle is started in each case when the sequence solenoid (KS1) is caused to rotate to the "SETUP" position by means of voltage applied to sequence switch S1A through relay K12 contacts.

Following is a simplified diagram of the re-channelling/interlocking circuits:



K11 and K18 are the basic re-channel control relays. Under normal operating conditions, K11 is energized and K18 de-energized. When a new frequency is selected either K18 or K11 is affected and in either case, the sequence solenoid (KS1) rotates the sequence switch (S1) to the "SETUP" position causing the transmitter to automatically retune. Relay K13 is an interlock relay associated with K11 so that once K11 is de-energized, it remains de-energized until the sequence switch (S1) reaches the "SETUP" position after which it may again be energized.

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

3. SEQUENCE CONTROL CIRCUITS
(See Drawing #AT-144 #149)

Assuming that the +27.5 volt circuit in the AT-144 has been energized, and that the time delay relay (TD1) has operated, the following is necessary in order to change the transmitter frequency:

a. (1) A new crystal drum position is selected by rotating the outer selector switch knob (1-24) to the desired number. This causes relay K18 to close, which in turn causes K12 to close. The +27.5 volts D.C. is applied through K12 contacts to the sequence solenoid control wafer (S1A) which in turn causes the sequence solenoid to rotate to the "SETUP" position.

(2) A new crystal bank is selected by rotating the inner selector switch knob (A-F) to the desired letter. This causes K11 to open which causes K12 to close. The sequence solenoid is then rotated to the "SETUP" position as described in (1) above. (Note that if the transmitter +27.5 volt D.C. supply is turned off, K11 is opened and when power is again applied, the effect is the same as if the inner selector switch knob (A-F) is changed.

b. The sequence solenoid in the "SETUP" position does the following:

(1) Sequence switch S1C de-energizes relay K12.

(2) Sequence switch S1E energizes K13 directly and energizes the band solenoid (KS2) through the interlocking contacts of K11, K18, and K16.

(3) Sequence switch S1F energizes the control motor which is to drive the crystal drum and tuning elements through individual clutches. (NOTE: The interlocking contacts of K18 insure that the variometer clutch cannot be energized until the crystal drum has been rotated to its proper position. Both clutches are never operated simultaneously).

(4) Sequence switch S1B does two things:

(a) Energizes the press-to-talk relay (K21) which causes the dynamotor to start and the PA and Modulator filaments to come on.

(b) Places a ground on the antenna tuner circuit "RETUNE INFO".

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

3. SEQUENCE CONTROL CIRCUITS (Continued)

b. (5) Sequence switch S1D places a shunt across the bias winding of control relay K4 (Terminals 1-8) so that approximately 12 MA PA grid drive will cause K4 to operate.

c. The band solenoid, having been energized as described in Step b (2) above rotates the band switch (S2K) around until it reaches point "B". This is the "home" position of the band switch. At this point K16 is energized and holds itself closed through its own contacts. At the same time, the band solenoid is de-energized. At this time, the +27.5 volts is also applied to the armature of control relay K4 through the front contacts of K16 and the back contacts of K19. This voltage is further applied to the variometer clutch which causes the tuning elements to start turning.

(Note that the secondary winding circuit of control relay K4 is made through the contacts of K17, K19, K22 and K20 to insure that K4 cannot operate except during the proper times in the tune-up sequence). Since K17 is now un-energized, the secondary winding of control relay K4 is open and hence K4 cannot be operated.

d. The rotation of the tuning elements causes the cam associated with microswitch MS1 to rotate (1 to 1 ratio). As soon as the microswitch (MS1) arm drops into a slot on the cam (this occurs at either maximum or minimum inductance on the tuning variometers), voltage is applied to relay K22 from the armature of K4 through microswitch MS1 and the contacts of K19. The band switch solenoid KS2 is energized from the armature of K4 through the contacts of K22, K19 and K16. This causes the band switch S2K to rotate to band one. (The band switch operates while the armature of MS1 is still in the cam slot). With the band switch at band 1, relay K17 is energized and the keying relay K1 is energized so that as soon as the armature of microswitch (MS1) moves out of the cam slot, the control relay K4 is ready to operate if PA grid current exceeding 12 MA occurs.

At this point, there are two possibilities; PA grid current may or may not appear. If there is no possibility of PA grid current (such as happens if there is no crystal, etc.), the band solenoid (KS2) will rotate S2-K to the next position each time microswitch MS1 is operated by the action of its associated cam. If there is still no PA grid current after band 8 has been tried, the band switch S2-K will rotate to position "A" which is the OFF position of this switch. At this point, voltage is applied through the contacts of K16 and sequence switch S1A to the sequence solenoid causing it to rotate to its "OFF" position.

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

3. SEQUENCE CONTROL CIRCUITS (Continued):

e. If PA grid current exceeding 12 MA occurs on one of the band switch positions, the following sequence takes place:

Voltage is applied from the armature of control relay K4 through the back contacts of K20 to the sequence switch control wafer (S1A) which causes the sequence solenoid to rotate the sequence switch to the final tune position. The sequence switch sets up the following new conditions:

(1) The coil of relay K12 is grounded through S1C.

(2) Relay K19 is energized through S1E.

(3) The shunt is removed from the bias coil of control relay K4 so that 16 MA PA grid drive is required to cause K4 to operate.

(4) +27.5 volts D.C. is applied to the armature of control relay K4. This in turn energizes the variometer clutch which again causes the tuning elements to rotate.

(5) During the final tune positions of the sequence switch, K19 is energized and microswitches MS2 and MS3 operate from a common associated cam which rotates with the buffer plate tuning variometer. This arrangement insures that during the final tuning period, the variometer tunes from maximum toward minimum inductance.

NOTE: During the final tuning cycle (or cycles) of the tuning elements, the following conditions must be satisfied before control relay K4 can be operated by PA grid current of the proper value:

(a) K20 must be energized.

(b) Microswitch MS2 must be open (armature up).

f. During the final tuning period and during the first revolution of the tuning elements, the following sequence takes place:

(1) The first time microswitch (MS2) armature is down (corresponding to MS2 closed or K4 secondary de-energized) and microswitch MS3 armature up simultaneously, voltage is applied from the armature of K4 through MS2 to close K22 and from the armature of K4 through K22 contacts, and MS3 to energize K20. K20 holds itself closed through its own contacts.

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

3. SEQUENCE CONTROL CIRCUITS (Continued):

f. (2) The tuning element continues rotating until microswitch MS2 opens (this occurs at maximum inductance of the tuning variometers) and the control relay K4 will operate if the PA grid current exceeds 16 MA.

g. If control relay K4 operates during the final tune period, the variometer clutch is de-energized and voltage is applied from the armature of K4 through K20 contacts to energize K14. K14 causes voltage to be applied to the sequence switch wafer S1A which in turn causes the sequence solenoid to rotate the sequence switch to "OFF".

h. If the PA grid current does not reach 16 MA during the first step of the final tune period, microswitch MS2 operates at the minimum inductance end of the tuning variometers. Voltage is applied from K4 armature through K22 contacts, K19 contacts, MS3, and K20 contacts to the sequence solenoid, causing it to rotate the sequence switch to "2". As soon as the tuning variometers reach maximum inductance again, microswitch MS2 opens and the tuning cycle described in step "g" is repeated with the exception that 14 MA PA grid current or greater will cause K4 to operate.

i. If the PA grid current does not reach 14 MA, step "h" is repeated with the control relay set to operate at 12 MA (or greater) PA grid current. If the PA grid current is never 12 MA, a fourth attempt will be made to tune. This time, PA grid current of 9 MA will cause K4 to operate. If PA grid current is less than 9 MA, the sequence switch is rotated to the next position which is the "OFF" position.

j. If the PA grid current is sufficient to cause K4 to operate during any one of the four final tuning attempts, voltage will be applied from the armature of K4 through K20 contacts to energize K14. The operation of K14 causes sequence solenoid KS1 to rotate the sequence switch to the "OFF" ("HOME") position.

4. AUTOMATIC TUNING CONTROL RELAY (K4) CIRCUITS:

Automatic tuning control relay (K4) is a polar magnetic latching type relay provided with two separate windings. One of these windings (1-8) serves as a bias winding and controls the transmitter tuning sensitivity, while the other winding (2-3) is energized by the transmitter PA grid current. The relay operates on a one milliampere differential so that a difference of one milliampere (or more) in the windings causes the relay to operate in a direction controlled by the winding with the higher current. Thus, if the PA grid current exceeds by one milliampere (or more), the amount of control current

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

4. AUTOMATIC TUNING CONTROL RELAY (K4) CIRCUITS:(Continued)

through the bias winding (1-8), the relay operates to close relay contacts 4 and 6.

The amount of control current in the bias winding (1-8) is controlled by the following:

a. Adjustment of the "TUNING SENSI" control (R19).

b. Position of the sequence switch (Section S I D).

The "TUNING SENSI" control is usually adjusted for a maximum tuning sensitivity of 16 MA PA GRID CURRENT which provides the following approximate currents in the windings of K4:

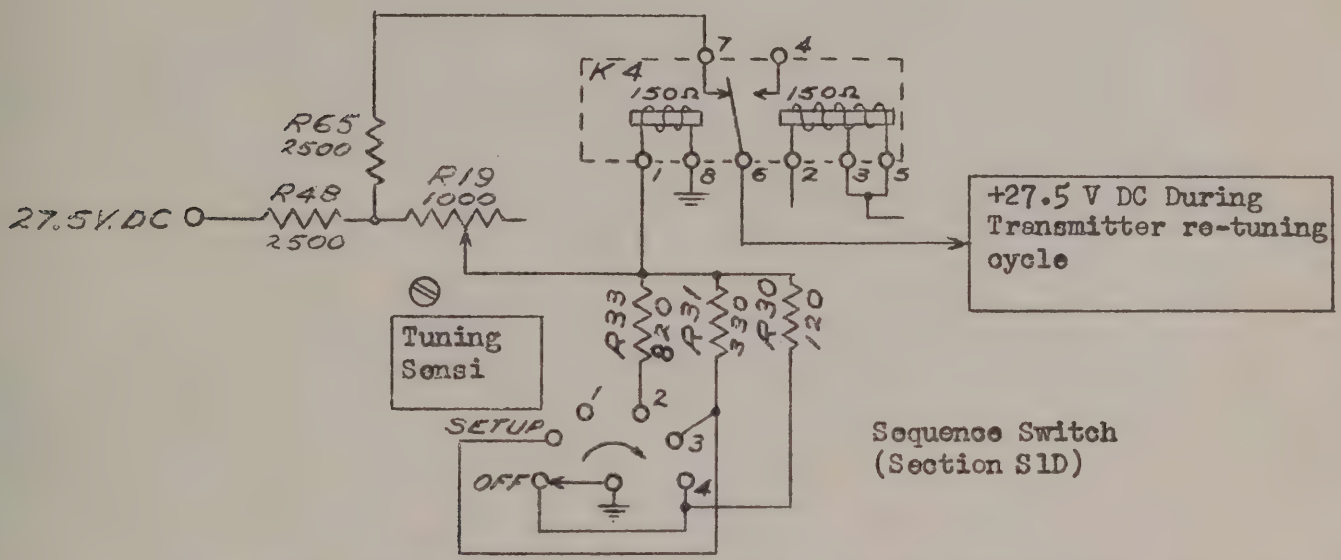
SEQUENCE SWITCH POSITION	CURRENT THROUGH WINDING (1-8) MILLIAMPERES	PA GRID CURRENT REQUIRED TO OPERATE K4 (CLOSING CONTACTS 4-6) MILLIAMPERES
OFF	8	9 or more
SETUP	11	12 or more
1	15	16 or more
2	13	14 or more
3	11	12 or more
4	8	9 or more

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

4. AUTOMATIC TUNING CONTROL RELAY (K4) CIRCUITS (Continued):

Following is a simplified diagram of the TUNING SENSITIVITY CONTROL CIRCUIT:



NOTE: When K4 starts to operate to close contacts 4-6, resistor R65 is disconnected from the tuning sensitivity circuit, reducing the current in winding 1-8 and thereby increasing the differential current to insure positive operation.

The circuit including K4 winding 2-3 (PA Grid Winding) is interlocked so that it is inoperative when:

a. Band switch (Section S2K) is not on an RF Band Position (Relay K-17 unenergized).

b. Band switch is changing positions (Relay K22 energized).

c. Transmitter is in process of final tuning (sequence switch on position "1"), if K20 in un-energized. (Note: K20 becomes energized during the first revolutions of the tuning variometers after the sequence switch has reached position "1").

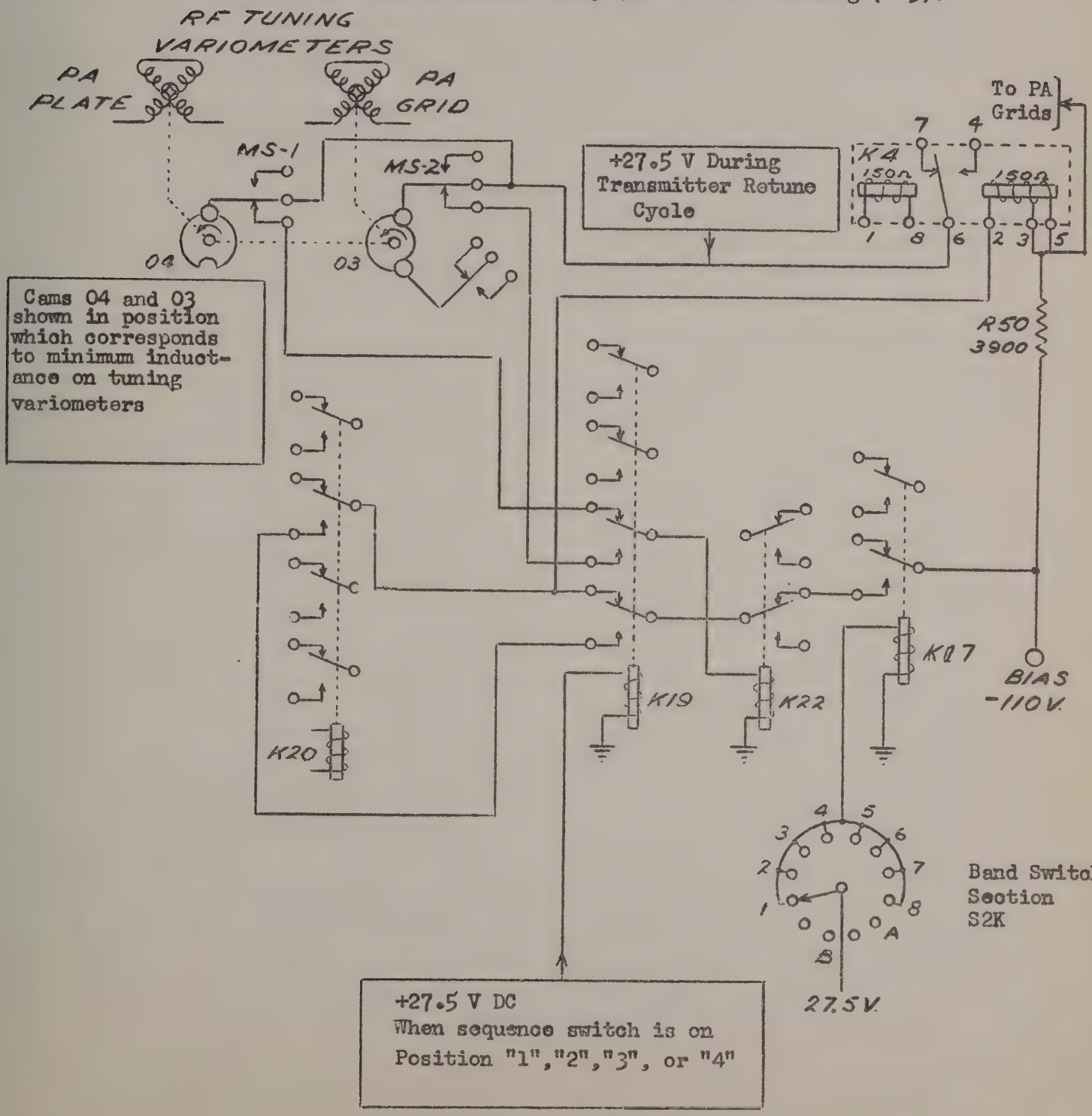
d. Transmitter is in process of final tuning and the RF tuning variometers are rotating in a direction which increases their inductance (microswitch MS2 circuit closed) (K22 energized).

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUITS (Continued):

4. AUTOMATIC TUNING CONTROL RELAY (K4) CIRCUITS (Continued):

Following is a simplified diagram of the circuits including automatic tuning control relay (K4) PA GRID winding (2-3):



XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUIT (Continued):

5. AAT TUNER/AT-144 TRANSMITTER INTERLOCKING CIRCUITS:
(See Drawing No. B-1057

Circuits which are common to both the AT-144 Transmitter and the AAT Automatic Antenna Tuner include the following:

a. RETUNE INFO. - This circuit is grounded at the transmitter (Sequence switch section S1B) during each transmitter retune cycle and causes the antenna tuner to also retune.

b. TRANSMITTER HOLD AND AF MUTING. This circuit is grounded at the antenna tuner either when the AAT is tuning, immediately following a transmitter retune cycle or if the antenna tuner fails to tune within approximately 30 seconds after it has received RETUNE information from the transmitter. In either case, transmitter relay K15 becomes energized and mutes the transmitter audio by placing 27.5 volts bias on the transmitter "Speech Amplifier" tube (V6).

If the antenna tuner is in the process of tuning, following receipt of RETUNE information from the transmitter, it causes the transmitter press-to-talk relay (K21) to remain energized ("Transmitter Hold" function) so that the transmitter continues to send RF energy to the tuner until it has completed its retuning.

If the antenna tuner fails to tune within the antenna tuner time delay period, the transmitter press-to-talk relay (K21) circuit is opened and since K15 remains energized the transmitter "press-to-talk" and "dynamotor start" circuits remain open so that the dynamotor cannot be started again until the transmitter is re-channelled.

c. VIBRATOR START. The "vibrator start" circuit provides a means whereby the AAT tuner makes a continuous check on the match between the antenna and the transmission line during each time the transmitter press-to-talk relay (K21) is energized (Note: this does not apply to the initial AAT retune cycle following a transmitter retune cycle, during which time the AAT vibrator is energized by an independent AAT circuit).

The "vibrator start" circuit is grounded at the transmitter each time the transmitter press-to-talk relay (K21) is energized. This causes AAT relay K3 to become energized and allows the AAT vibrator to start. The vibrator, when energized, allows the AAT tuning motors to function to correct any mismatch between the antenna and the transmission line.

XI. ELECTRICAL - DESCRIPTION (Continued):

D. CONTROL CIRCUIT (Continued):

5. AAT TUNER/AT-144 TRANSMITTER INTERLOCKING CIRCUITS (Continued):

d. TIME DELAY. The AAT Tuner time delay period (approximately 30 seconds) starts at the time the AAT retune relay (K7) is energized. If the transmitter and tuner fail to complete a normal tuning function during the tuner time delay period, AAT relay K4 becomes energized with the following results.

(1) AAT relay K5 becomes energized.

(2) Transmitter relay K15 becomes energized.

(3) Transmitter press-to-talk relay circuit is broken (through K15 contacts) so that the DPU dynamotor cannot be started until the transmitter is re-channelled.

(4) A +27.5 volts D.C. signal is applied from the AAT tuner to the transmitter "OFF" relay (K14), causing the transmitter sequence switch to be turned to the "OFF" position (ordinarily the transmitter sequence switch will already be at the "OFF" position unless the transmitter has failed to function properly).

e. BAND INFORMATION. AT-144 Transmitter band switch (Section S2-J) is utilized as a selector switch for AAT tuner band switch assembly (Z9). The transmitter band switch and the tuner band switch rotate simultaneously, the tuner following each time as the transmitter band switch changes position.

Note: Although there are only 8 RF bands in the transmitter, the tuner band switch follows that of the transmitter on 9 positions. The 9th position ("A") provides a position on the tuner band switch whereby the AAT input and output RF terminals are essentially connected together.

If the system uses a common transmitter/receiver remote selector switch, a position might be selected which provides a receiving frequency only. In this case, the transmitter tries to tune on each of the 8 RF bands and failing to find excitation, goes to the 9th position ("A") on the band switch which allows the receiver antenna circuit to bypass the AAT tuning elements.

f. RF CIRCUIT. The RF connection between the AT-144 transmitter and the AAT tuner consists of a nominal 52 ohm coaxial transmission line (RG-8/U).

XII. AT-144 TRANSMITTER MAINTENANCE

A. TEST EQUIPMENT

The following test equipment facilitates bench checking the AT-144 Transmitter/DPU Dynamotor Power Unit.

1. VARIABLE FREQUENCY RF OSCILLATOR, to provide external excitation for the transmitter. The oscillator should be capable of supplying a variable output of approximately 10 volts RMS maximum to a 52 ohm load over a frequency range of 1.6 to 22 Mc.

   A recommended unit is the General Radio Type 1330-A Bridge Oscillator. This unit is supplied with a 3-foot 50 ohm coaxial cable patch cord (General Radio Type 874-R21). In order to use the patch cord to connect the bridge oscillator output to the AT-144 transmitter "EXTER-FREQ. CONTROL INPUT" receptacle (J10), an adapter is required (General Radio Type 874-QBP) and must be ordered separately.

2. DUMMY LOAD. Should be a non-inductive 52 ohm resistor capable of dissipating 200 watts. A recommended unit is the BIRD ELECTRONIC CORPORATION (1800 E. 38TH Street, Cleveland 14, Ohio) "Model 82 TERMALINE COAXIAL RESISTOR".

3. VACUUM TUBE VOLTMETER. To provide E^2/R method of measuring power into the dummy load. The meter should provide stable and reliable voltage measurements up to 150 volts RMS at frequencies up to 22 Mc. (General Radio Model 726-A or similar).

4. MODULATION INDICATOR. To facilitate making transmitter audio adjustments. Either of the following types of equipment provides satisfactory indication:

   a. MODULATION MONITOR. Should be capable of measuring positive and negative modulation peaks at audio frequencies in the range 100-10000 cps and at RF frequencies in the range 1.6 to 22 Mc. (General Radio Type 1931-A Amplitude-Modulation monitor or similar unit).

   b. OSCILLOSCOPE. Should provide for both AC and DC indications (DUMONT Model 304H or similar).

5. AUDIO SIGNAL GENERATOR. Should provide a calibrated and variable sinusoidal output voltage over an audio frequency range of 100 to 10,000 cps. (Hewlett-Packard Model 205-A Audio Signal Generator or similar unit).

6. AUDIO OUTPUT POWER METER. Should be capable of measuring audio power up to 50 milliwatts into a 500 ohm audio load resistor.

   A recommended unit is General Radio Model 583-A Output Power Meter.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued)

A. TEST EQUIPMENT (Continued):

7. REMOTE SELECTOR SWITCH. To provide a check on the transmitter selector system. Should provide selector circuit as indicated on Drawing AT-144 #170.

   A recommended unit is GABLES ENGINEERING CO. (247 Greco Avenue, Coral Gables, Fla.), Model CWS Selector Switch, for AR/AT-144.

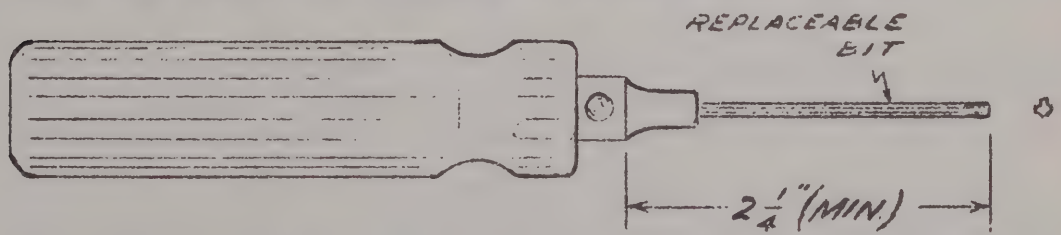
8. MICROPHONE. Single button carbon microphone similar to type to be used with the equipment in service.

9. VOLT-OHM-MILLIAMMETER. (SIMPSON MODEL 260 or similar unit).

10. POWER SUPPLY (+27.5 volts D.C.). Should be a well regulated power supply capable of supplying 50 amperes at any desired voltage in the range 20 to 30 volts D.C.

11. AAT FUNCTION CHECKER. A Model AAT Automatic Antenna Tuner is required to check the transmitter/tuner interlocking circuits.

12. BRISTOL SCREW DRIVER TYPE SET SCREW KEY. Facilitates making mechanical alignments involving the use of Bristol #6 multiple spline set screws. A suitable tool is manufactured by THE BRISTOL COMPANY (WATERBURY 91, CONN.) "No. 6 Screw Driver Type Key for Multiple Spline Screws". This key is provided with a removable multiple spline #6 bit (should be at least 2-1/4" long) for which spare bits may also be obtained from THE BRISTOL COMPANY.



13. TEST COVERS. In order to make adjustments on the transmitter with covers removed, it is necessary to use a partial top cover (which covers the variometers but leaves the RF adjustments accessible) and a partial right side cover (which covers the variometers but leaves the audio adjustments accessible). The partial top cover should be provided with fasteners (DZUS Type AJ3-30) to suit existing transmitter Dzus springs. The partial right side cover should be provided with mounting holes suitable for mounting on the transmitter.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

B. FREQUENCY PLAN CHANGE PROCEDURE:

The following procedure is recommended for changing the AT-144 transmitter frequency plan:

1. Turn the transmitter OFF so that the crystal drum drive circuit cannot be energized.

2. Remove the crystal drum cover (located on the front panel) after disconnecting the two Dzus fasteners.

3. Remove the crystals constituting the "old" frequency plan. (Note: the drum drive worm shaft extends forward of the transmitter and is spring loaded so that it can be pushed away from the drum, disengaging the drum drive gears. This makes the drum free to turn so that any desired crystal can be made accessible. Each crystal is held in place by two screws and can be removed by turning the screws out about 1/4".

4. Install the crystals required for the "new" frequency plan in the proper crystal slots, and tighten the screws.
NOTE: The crystal drum is marked with numbers 1-24 at the top end of the drum. These numbers correspond to drum positions and a given number applies to 6 crystal slots located in line below the number. Each of the group of 6 crystal slots is further identified by a letter (A,B,C,D,E or F) which is engraved on the transmitter handle adjacent to the crystal drum. Thus, in a particular vertical row of crystal slots under the number "24", the top crystal slot would be 24A, the next slot 24B, etc.

5. Apply a very small amount of grease (Specification #AN-G-25) to the pins of the newly inserted crystals by touching them with the end of a small grease brush. All excess grease should be removed.

6. Turn the equipment on and allow the transmitter to tune on each of the new frequencies. NOTE: The crystal pickup springs make contact on the ends of crystal pins. Occasionally it is necessary to clean the ends of the pins on a new crystal to insure good contact with the pickup springs.

7. Replace the drum dust cover.

C. SUB-ASSEMBLY REPLACEMENT.

NOTE: No sub-assembly (plug-in or other) should be removed or installed when power is applied to the equipment.

Following is a list of sub-assemblies and a recommended procedure for making a replacement.

1. CRYSTAL DRUM ASSEMBLY (including drum control switch assembly, Z5).

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

C. SUB-ASSEMBLY REPLACEMENT (Continued):

1. CRYSTAL DRUM ASSEMBLY (including drum control switch assembly, Z5) (Continued):

a. REMOVAL

(1) Remove drum dust cover & transmitter top dust cover.
(2) Disengage drum switch plug (P7) from its receptacle (J7).
(3) Remove the drum dust cover mounting bracket located at the right of the crystal drum.
(4) Remove the two screws which secure the bottom bearing block to the front panel.
(5) Remove the three screws which secure the top bearing block to the front panel.
(6) Remove the drum and switch assembly from the transmitter.

If the drum control switch assembly is to be removed from the drum shaft, the following additional steps are necessary:

(7) Remove the worm gear and indicator gear after loosening the #6 Bristol set screws (2 set screws on each gear).
(8) Remove the collar.
(9) Remove the switch assembly after loosening the #6 Bristol set screw on the switch rotor member.

b. REPLACEMENT

The crystal drum assembly is mounted on the transmitter by following the "REMOVAL" procedure in reverse order.

c. ADJUSTMENTS

After the drum and control switch assembly have been mounted on the transmitter, the following adjustments may be necessary:

(1) SWITCH (S3) ROTOR ALIGNMENT.

(a) Tighten the #6 Bristol set screw on the switch rotor. This secures the switch rotor to the drum shaft.
(b) With voltage applied to the transmitter, select a position (1-24) on the remote selector switch which causes the transmitter drum to stop with the drum control switch (S3) rotor locking set screw accessible. Turn the transmitter OFF again. (Note the position of the remote selector switch).
(c) Loosen the set screw securing the drum control switch rotor to the drum shaft. (This allows the drum to be rotated without changing the switch rotor position). Push the drum drive worm out away from the worm gear and rotate the crystal drum until the number on the crystal slot under the crystal pickup springs agrees with the number selected on the remote selector

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

C. SUB-ASSEMBLY REPLACEMENT (Continued):

1. CRYSTAL DRUM ASSEMBLY (Continued):

a. ADJUSTMENTS (Continued):

(1) SWITCH (S3) ROTOR ALIGNMENT (Continued):

switch. Tighten the set screw on the drum control switch rotor.

(2) DRUM DRIVE GEAR MESH.

The mesh between the drum drive gear and the drum drive worm is adjustable by means of an off center stop located in a slot at one end of the drum drive shaft bearing block. The bearing block is forced against the adjustable stop by a spring. The stop adjusting screw is accessible from the front panel (located just above the worm shaft).

If the gears are improperly meshed after replacing the drum assembly on the transmitter, the gear mesh adjusting screw should be loosened, the stop adjusted for correct gear mesh, and the screw tightened again while the stop is held in the correct position.

2. RF EXCITER ASSEMBLY (Z1)

a. REMOVAL

(1) Remove crystal drum (see "1" above).
(2) Place the band switch (S2) on band 3, loosen the two Bristol #6 set screws at the front end of the band switch shaft coupling (located just back of the P.A. tubes) and remove the front section of the band switch shaft.
(3) Remove the left mounting rail at the top of the transmitter.
(4) Disconnect the three electrical connections. (Crystal pickup, crystal ground return, and external RF exciter terminal) at the front end of the exciter assembly.
(5) The assembly is secured to the chassis by means of four screws (accessible from the top of the assembly) and a spade bolt (nut accessible from underneath the chassis). These items should be removed.
(6) Remove the buffer tube (6146) plate cap.
(7) Remove the exciter assembly (use a small screw driver to facilitate disconnecting P5 from J5).

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

C. SUB-ASSEMBLY REPLACEMENT (Continued):

2. RF EXCITER ASSEMBLY (Z1) (Continued):

b. REPLACEMENT

The exciter assembly is mounted on the transmitter by following the "REMOVAL" procedure in reverse order. (CAUTION: A shaft grounding spring located in the RF AMP section should be moved toward the center of the transmitter to clear the front shaft section while it is being replaced).

c. ADJUSTMENTS

After installing a new RF exciter assembly, the "OSCILLATOR" and "RF AMP" tuning adjustments must be checked. The tuning procedure is described in a separate section (ELECTRICAL ADJUSTMENTS AND MAINTENANCE, "RF ALIGNMENT").

3. AUDIO ASSEMBLY (Z2)

a. REMOVAL AND REPLACEMENT

(1) Remove the transmitter top and right side covers.
(2) Remove the two screws securing the audio assembly to the transmitter rear panel.
(3) Lift the audio assembly UP to disconnect P3 from J3.
(4) Remove the audio assembly through the opening at the right side.
(5) Replace the audio assembly by following the above procedure in reverse order.

b. ADJUSTMENTS

After installing a new AUDIO assembly, it is necessary to check the audio "GAIN" and "CLIPPER" adjustments. The adjustment procedure is described in a separate section (ELECTRICAL ADJUSTMENTS AND MAINTENANCE, "AUDIO ADJUSTMENTS").

4. CONTROL RELAY ASSEMBLY (Z3)

a. REMOVAL AND REPLACEMENT.

(1) Remove the bottom transmitter cover.
(2) Remove the relay assembly dust cover after removing the two mounting screws which hold it in place.
(3) Remove the two hex standoffs which secure the relay assembly to the transmitter chassis.
(4) Carefully disconnect P4 from J4. A small flat blade screw driver facilitates disconnecting P4 evenly throughout its length.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

C. SUB-ASSEMBLY REPLACEMENT (Continued):

4. CONTROL RELAY ASSEMBLY (Z3) (Continued)

a. REMOVAL AND REPLACEMENT (Continued)

(5) Remove the control relay assembly from the transmitter chassis.
(6) Replace the control relay assembly by following the above procedure in reverse order.

b. ADJUSTMENTS

No adjustments are necessary on a new control relay assembly.

5. BAND SOLENOID ASSEMBLY (Z4)

a. REMOVAL AND REPLACEMENT

(1) Remove the transmitter top and left side covers.
(2) Remove the modulator tubes.
(3) Disconnect the modulation transformer (T3) terminals and mark the leads.
(4) Remove the modulation transformer after removing the four screws which secure the transformer to the transmitter chassis.
(5) Disconnect P6 from J6.
(6) Place the band switch (S2) on band "3" and loosen the two Bristol #6 set screws at the rear of the band switch shaft coupling (located just back of the PA tubes).
(7) Remove the two screws from the band switch solenoid mounting bracket.
(8) Remove the solenoid assembly after first moving it toward the rear of the transmitter to free the shaft from the PA switch sections.
(9) Replace the band solenoid assembly by following the above procedure in reverse order. Make sure that the band switch shaft sections are properly aligned with respect to each other before tightening the set screws on the shaft coupling.

b. ADJUSTMENTS

No adjustments are necessary on a new band solenoid assembly.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

C. SUB-ASSEMBLY REPLACEMENT (Continued):

6. P.A. RF SWITCH (Z7)
(Includes band switch sections S2-G and S2-H)

a. REMOVAL AND REPLACEMENT.

(1) Remove the band solenoid assembly using the procedure described above.
(2) Remove the P.A. tubes (4-65A).
(3) Disconnect the P.A. Plate switch section (S2-G) Connections as follows:

(a) Connection to tuning variometer L12. Remove the hex nut at the switch wafer (use 3/16" open end wrench).
(b) Connections to PA plate tuning capacitors (4 connections). Remove the screws securing the solder lugs to the capacitors.
(c) Connection to PA plate coupling capacitor (C44). Remove the screw securing the solder lug to C44.

(4) Disconnect the PA Plate switch section (S2-H) connections (5 total) by removing the hex nuts on the switch wafer (use a 3/16" open end wrench).
(5) Remove the two screws which secure the PA RF switch assembly to the transmitter chassis (accessible from the bottom of the transmitter chassis).
(6) Remove the assembly from the transmitter.
(7) Replace the assembly by following the above procedure in reverse order.

b. ADJUSTMENTS

No adjustments are necessary on a new PA RF switch assembly.

7. SIDETONE RECTIFIER ASSEMBLY (Z6)

a. REMOVAL AND REPLACEMENT
(This assembly is located on the bottom of the transmitter chassis between the modulator and PA tube sockets)

(1) Disconnect resistor R56 (1500 ohms) at the sidetone rectifier assembly.
(2) Disconnect and mark the two cable wires which terminate on the assembly.
(3) Remove the three screws which secure the sidetone rectifier assembly to the transmitter chassis (two screws accessible from the top of the transmitter chassis, one from the bottom) and remove the assembly.
(4) Replace the assembly by following the above procedure in reverse order.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

C. SUB-ASSEMBLY REPLACEMENT (Continued):

7. SIDETONE RECEIVER ASSEMBLY (continued):

b. ADJUSTMENTS

No adjustments are necessary on a new sidetone rectifier assembly.

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE

1. RELAYS

Relays should be inspected at regular intervals. Check the relay contacts for proper alignment, follow through, pitting and corrosion. Use a burnishing tool (Western Electric #265B or equivalent) for cleaning the contacts.

a. Control Relays (K11-K24 inclusive).

The control relays are midget telephone type relays and are mounted on the control relay assembly (Z3). The relay contacts are made accessible (with the control relay assembly removed from the transmitter) by removing the contact guard plates which are secured to the bottom of the assembly.

Relay Symbol	Coil Resistance Ohms	Minimum volts DC required to operate relay	Nominal operating volts DC in transmitter
K11	150	8	13.75
K12-K24 inclusive	245	18	27.50

b. Keying Relay (K1) and Filament/Blower/Dynamotor Start Relay (K3).

These relays are mounted on the bottom side of the main transmitter chassis (Relay K1 near the PA tube socket, K3 near the front panel). The relay terminals and contacts are accessible for inspection and adjustment.

Characteristics are as follows:

Coil	Resistance Ohms	Minimum volts DC required to operate relay	Nominal operating volts DC in transmitter
K1	160	22	27.5
K3	410	22	27.5

c. Crystal Selector Relays (K5-K10 inclusive)
External Frequency Selector Relay (K2)

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. RELAYS (Continued)

Relays K5-K10 are mounted in a vertical row on the crystal pickup finger board near the front panel. Contacts and terminals are accessible with the transmitter top and left side covers removed.

Relay K2 is located inside the oscillator compartment. The contacts are accessible for inspection and adjustment with the transmitter left side cover removed.

K2 and K5-K10 inclusive are identical relays with characteristics as follows:

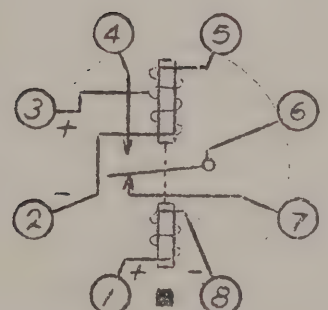
Coil Resistance.....150 ohms

Minimum volts DC required to operate relay..... 8

Nominal operating volts DC in transmitter.....13.75

d. Automatic Tuning Control Relay (K4)

Relay K4 is a hermetically sealed, polarized, plug-in relay and requires no maintenance. Characteristics are as follows:



BASE DIAGRAM
K 4

2-3 Resistance 150 ohms ±20 ohms
3-5 Resistance Approx. 20 ohms (electrical damping section)
1-8 Resistance 150 ohms ±20 ohms
1 Milliampere (±0.5 MA) through either winding (1-8 or 2-3) with polarity as shown should close contacts 6-7, with opposite polarity should close contacts 6-4.
Relay is magnetic latching type and will remain in either position with windings unenergized.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

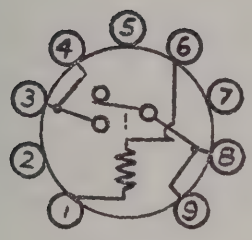
D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. RELAYS (Continued):

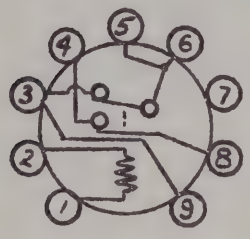
e. Time Delay Relay (TD1)

TD1 is a hermetically sealed snap action plug-in thermal time delay relay and requires no maintenance. Characteristics are as follows:

Heater Resistances (Heater element cold)) Amperite Approximately 70 ohms
) Eureka Approximately 250 ohms



AMPERITE
Type 26N060T



EUREKA
Type 26.5-60-C

26.5 volts DC applied to heater section should cause relay to operate after approximately 60 seconds

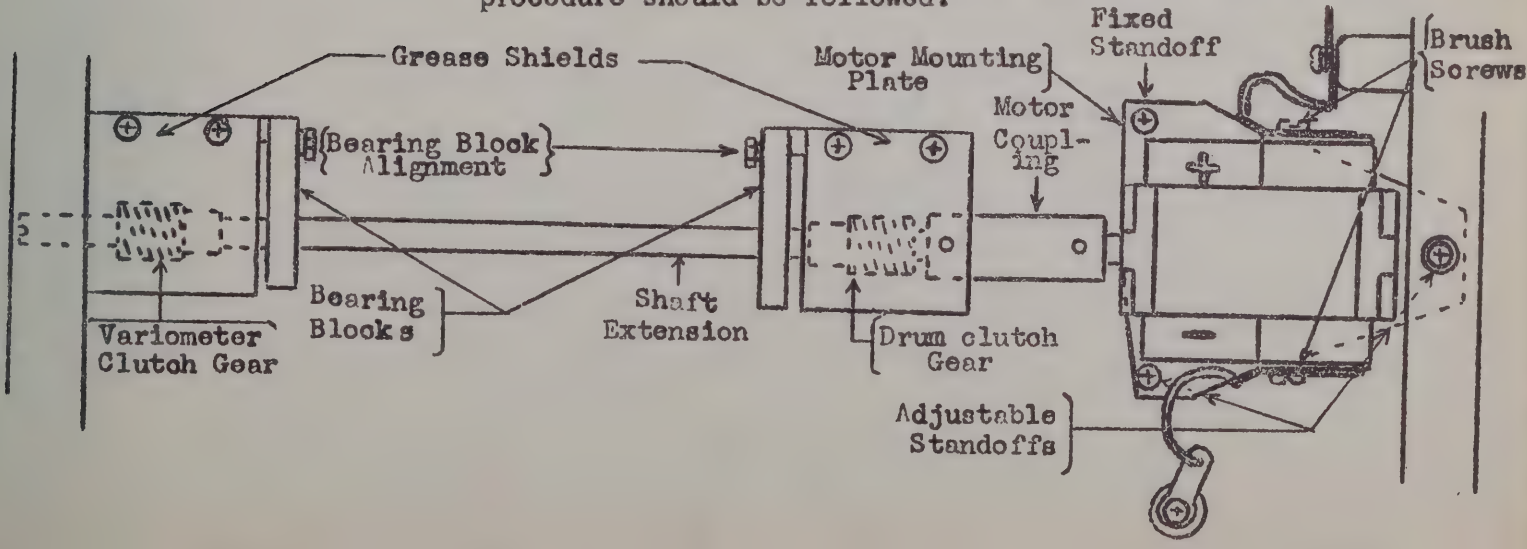
BASE DIAGRAMS

2. MOTORS:

Motors should be inspected at regular intervals, at which time defective brushes should be replaced. Motors are factory lubricated and no further lubrication is necessary.

a. Drum Positioning/RF Tuning Motor (B1)

B1 is a PM Type D.C. motor designed to operate at any voltage in the range of 22-30 volts. It is located on the bottom of the main transmitter chassis near the rear panel. The motor brushes may be removed for inspection without removing the motor. A brush should be replaced if its length is less than 1/8 inch or if the brush spring is weak.
If it becomes necessary to remove the motor, the following procedure should be followed:



XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

2. MOTORS (Continued):

1. Remove all voltage from the transmitter.

2. Remove the two grease shields (see sketch above).

3. Disconnect the two motor electrical terminals (remove screws at terminal standoffs).

4. Remove the two bearing block alignment screws.

5. Remove the three screws which secure the motor mounting plate to the standoffs.

6. Remove the motor assembly (together with the shaft extension) from the transmitter.

7. Loosen the two motor coupling set screws (Bristol #6) at the end near the motor and separate the motor from the shaft extension.

8. Remove the two screws which secure the motor to its mounting plate.

9. The motor may be replaced by following the above procedure in reverse.

NOTE: If a new motor is installed, the mechanical alignment of the motor and shaft extension should be carefully checked. The bearing block alignment screws and the two adjustable length standoffs supporting the motor mounting plate provide a means of aligning the motor shaft, together with its extension so that the shaft extension runs true and allows the worms to mesh properly with the clutch gears.

b. Blower Motor (B2)

B2 is located above the transmitter main chassis near the front panel. It may be removed for inspection after disconnecting (and marking) the two motor leads and removing the three mounting screws (accessible from the bottom of the transmitter chassis).

A brush should be replaced if it is less than 1/4" long or if the brush spring is weak.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

3. ROTARY SOLENOIDS (KS1 and KS2)

The rotary solenoids are factory lubricated and should not require further lubrication.

Sequence solenoid (KS1) is mechanically coupled to the sequence switch (S1A-S1F) and is located on the bottom of the transmitter chassis and near the front panel. A detent (located at the extreme end of the sequence switch shaft) and a contactor (S6) are integral parts of the solenoid/switch assembly.

The sequence solenoid/switch assembly is secured to the transmitter chassis by means of two screws which may be removed to facilitate full inspection of the assembly.

Band switch solenoid (KS1) is a part of the band solenoid assembly (Z4) further described in a separate section "SUB-ASSEMBLY REPLACEMENT", "BAND SOLENOID ASSEMBLY", page 26 . A detent (located on the band switch shaft at the front end of the PA compartment) and a contactor (S7) are integral parts of the band solenoid/switch.

KS1 and KS2 are identical units with the following characteristics:

Coil Resistance.....Approximately 10 ohms

Operating volts.....22-30 volts, D.C.

CAUTION: (1) Rotary Solenoids should not be operated electrically without the detents in place as mechanical jamming may occur.

(2) Rotary Solenoids are designed for pulse type operation. Voltage should not be applied to the coil continuously during bench checks.

4. CLUTCH/BRAKE ASSEMBLIES 01 and 02.

Clutch/brake assemblies 01 and 02 are identical units with the following characteristics:

Coil Resistance.....Approximately 50 ohms

Operating volts.....22 - 30 volts D.C.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

4. Mechanically, the clutch/brake consists of a driving shaft member (geared to the motor), a driven member (coupled to the load) and an electrically operated clutch whose armature controls the position of the driven member. One end of the driven member is attached to a metal disc which engages a rubber faced clutch plate on the driving member, when the clutch is energized; and which rests against a cork brake disc attached to the assembly frame, when the clutch is not energized.

The clutch/brake assemblies should be inspected and all parts checked for excessive wear at regular intervals.

If it is necessary to remove an assembly, the following procedure should be followed:

a. Drum Clutch/Brake Assembly (01).

(1) Remove the motor (B1) and shaft extension. (See page 30 for procedure).

(2) Remove the modulation transformer (T3).

(3) Remove the four clutch/brake assembly mounting screws (accessible at the top of the transmitter chassis).

(4) Disconnect (and mark) the two cable wires from the assembly terminals.

(5) Remove the assembly.

b. Variometer Clutch/Brake Assembly (02)

(1) Remove the motor (B1) and shaft extension. (See page 30 for procedure).

(2) Remove the audio assembly (Z2). (See page 25 for procedure).

(3) Remove the mounting hardware from R10 (located in the power resistor section adjacent to the audio assembly).

(4) Remove the three clutch/brake assembly mounting screws (accessible at the top of the transmitter chassis).

(5) Disconnect (and mark) the three cable wires from the assembly terminals.

(6) Remove the assembly.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

5. Automatic Tuning Elements - Mechanical Alignment.

Buffer plate tuning variometer (L11) and PA plate tuning variometer (L12) are geared to a common drive shaft by means of identical gears, so that they are rotated simultaneously at the same speed. Sequence cams 03 and 04 rotate at the same speed as the variometers since each is secured directly to a variometer shaft extension.

The tuning variometers together with the associated cams and microswitches may be mechanically aligned using the following procedure:

a. Remove all voltage from the equipment.

b. Remove the top and bottom transmitter covers.

c. Operate the variometer clutch manually (by holding armature closed) and rotate the tuning motor shaft until the set screw on each variometer split gear is accessible. Loosen the variometer gear set screws (using a #6 Bristol L shaped set screw key). The variometers are now free to turn independently. (Note: The variometer gear set screw locks the variometer shaft extension by means of a split bushing. There are no flats on the variometer shaft extension).

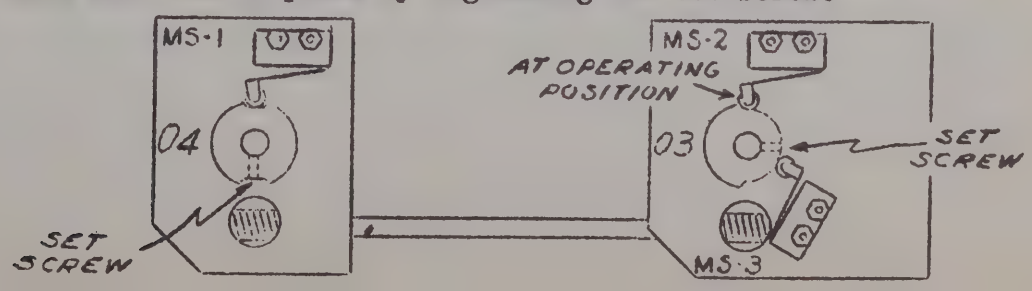
d. Rotate cam 04 and adjust the microswitch (MS1) mounting plate so the microswitch is operated with the actuator half way between its inner and outer positions as determined by the cam surface.

e. Repeat the above step with cam 03 and microswitches MS2 and MS3.

f. Rotate each variometer to its minimum inductance position and tighten the set screw in the split gear, locking the variometer shaft in place.

Note: The variometer is at its minimum inductance position when the rotor and stator turns are parallel to each other and when the bottom rotor/stator connecting bracket ("T" shaped) is turned toward the outside of the transmitter.

g. With the variometers locked in position at minimum inductance, position cams 03 and 04 as shown in the following sketch and lock each cam in place by tightening its set screw.



XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

6. Band Switch (S2) Alignment.

The band switch shaft is divided into two sections. The rear shaft is a part of the band solenoid (KS2) and operates the rotors on the band switch control sections (S2K and S2J) and PA Plate RF Sections (S2G, S2H and S2I). The front shaft operates the band switch buffer RF sections (S2C, S2D and 2SE) and RF exciter sections (S2A and S2B). The mechanical coupling between the shaft sections is located in the PA compartment near the PA tubes (4-65A). A detent is located on the front shaft section at the front end of the PA compartment.

The band switch shaft may be rotated manually using a 3/16" open end wrench directly on the switch shaft.

CAUTION: The band switch rotates in a counterclockwise direction as viewed from the front end of the transmitter. Any attempt to turn the shaft manually in the wrong direction may result in damage to the PA section rotor contact.

There are 12 band switch positions, 10 of which are used. Following is a list of the positions in the order in which they normally occur:

a. "HOME"
b. Not used
c. Band "1"
d. Band "2"
e. Band "3"
f. Band "4"
g. Band "5"
h. Band "6"
i. Band "7"
j. Band "8"
k. "A"
l. Not used

The bandswitch is shown on Drawing AT-144 #169 with the positions on each section labeled for reference in aligning the switch.

7. Anti-Backlash Gears.

Each tuning variometer shaft is coupled to a drive worm by means of a split (anti-backlash) gear. If a split gear is to be replaced or removed for any other reason, the following procedure should be followed:

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

D. MECHANICAL ADJUSTMENTS AND MAINTENANCE (Continued):

7. Anti-Backlash Gears (Continued):

a. Close the variometer clutch (C2) armature manually and turn the motor shaft until the variometer is at its minimum inductance position. (This position should make the split gear set screw accessible).

b. Loosen the variometer cam set screw and remove the cam.

c. Remove the two screws holding the variometer shaft bearing plate in place and pull the plate out far enough to expose the split gear.

d. Loosen the set screw in the split gear and remove the gear.

e. Install the gear back in place by following the above procedure in reverse.

NOTE: The normal position of the split gear when not engaged (no spring tension) is such that the teeth of one gear fall halfway between the teeth of the opposite gear. Before engaging with the worm drive, the split gears should be rotated with respect to each other in a direction to increase the spring tension until the gear teeth line up. This corresponds to a spring tension equal to 1/2 gear tooth rotation of one of the split gears with respect to the other.

The split gear should be engaged with the worm drive in a position which leaves the set screw accessible with the bearing plate in place.

8. Lubrication.

All motors, ball bearings, rotary solenoids, detents, and switch wafer metal parts are factory lubricated and should not require further lubrication.

The crystal drum rotates in "OILITE" bearings which should not require further lubrication.

All gears are factory lubricated with AN-G-25 grease. Gears should be inspected at regular intervals and a re-lubrication schedule established. When a gear is to be re-lubricated, it should be thoroughly cleaned and re-lubricated with AN-G-25 grease.

9. Set Screws.

All set screws ordinarily involved in mechanical maintenance are Bristol #6 multiple spline cup point socket screws.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE:

1. ELECTRICAL ALIGNMENT.

AN ACCURATE DC VOLTMETER SHOULD BE USED TO METER THE +27.5 VOLTS INPUT TO THE TRANSMITTER. THE VOLTAGE SHOULD BE KEPT WITHIN 1/2 VOLT OF 27.5 VOLTS (OR THE NORMAL AIRCRAFT OPERATING VOLTAGE) DURING THE TIME THE TRANSMITTER ADJUSTMENTS ARE BEING MADE.

a. INITIAL CONTROL CIRCUIT CHECK.

Apply power to the transmitter with the DPU Dynamotor Power Unit circuit breaker "OFF" (this removes the transmitter bias and prevents the dynamotor from turning so that no high voltage appears at the transmitter). The following should occur in the order listed:

(1) After approximately 60 seconds, the time delay relay should operate. This should start a transmitter retune cycle. With the meter switch on "BATT" position, the meter should read approximately 27.5 volts. (Note: The meter reads zero before the time delay relay operates).

(2) The transmitter should complete a retune cycle and turn itself off with the bandswitch in the "A" position and the sequence switch in the "OFF" position.

b. BIAS CHECK

Turn the DPU CIRCUIT breaker "ON" and check the bias voltage at one of the PA tube grids using an accurate DC volt meter. The bias voltage should be in the range 105-110 volts negative.

c. RF ALIGNMENT

(1) PRECAUTIONS

Operation of the transmitter involves the use of HIGH VOLTAGES which are dangerous to life. Operating personnel should observe all safety regulations. When the transmitter is being operated without all covers in place (such as when making adjustments, etc.) the DPU Power Unit circuit breaker should be kept in the "OFF" position at all times when the dynamotor is not being used.

The audio assembly should be removed while RF adjustments are being made.

Test covers (See "TEST EQUIPMENT" section, page 21 for details) must be in place during RF alignment.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

c. RF ALIGNMENT (Continued)

(1) PRECAUTIONS (Continued)

The transmitter RF output ("ANT. TUNER") should be terminated with a 52 ohm non-inductive resistive load (described under "TEST EQUIPMENT" section).

Any attempt to operate the transmitter with the external frequency selector switch improperly positioned may result in erratic operation. Particular attention should be paid to the crystal relay selector switch section which, if improperly positioned, causes the control circuit to relay K11 to be open, and prevents the transmitter from completing its retune cycle.

A crystal test socket is located at the left side of the transmitter (oscillator compartment) and may be used to provide crystal excitation when the crystal drum assembly is removed. No attempt should be made to use a crystal in the test socket if a second crystal is being used in the crystal drum or if the external excitation control relay (K2) is energized by the external selector switch.

No frequency measurement should be made on a crystal in the test socket.

An external variable frequency RF oscillator (described in SECTION "II, A, "TEST EQUIPMENT") provides a satisfactory RF signal for all transmitter RF adjustments. At the higher frequencies (10 Mc and above), there may be a tendency toward overall RF instability if the full output of the RF oscillator is used. This condition is corrected by reducing the output from the external RF oscillator.

Good electrical bonding must be provided between the transmitter and associated units. Suitable test bench bonding is provided by a common metallic surface supporting the various units with individual bonding to the surface. If a metal surface is impractical, 1/16" x 1" aluminum or copper conductors (or equivalent) should be used to provide a common ground connection between units.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

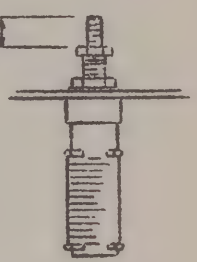
c. RF ALIGNMENT (Continued):

(2) PRELIMINARY ADJUSTMENTS.

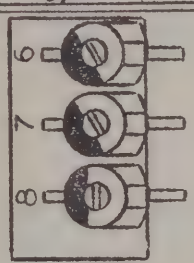
(a) Rotate "TUNING SENSI" control to approximately its mid-position.

(b) Check the variometer mechanical alignment (See instructions page 34).

(c) Position the "OSC", "RF AMP" and "BUFFER" adjustments as follows:



Adjustment	(Inches)
"OSC. 5"	7/16
"OSC. 6"	3/8
"OSC. 7"	5/16
"OSC 8"	3/8
RF AMP 4	1/4
RF AMP 5	5/16
RF AMP 6	5/16
RF AMP 7	1/2
RF AMP 8	7/16
BUFFER 1	1/2
BUFFER 2	7/16
BUFFER 3	7/16
BUFFER 4	7/16
BUFFER 5	3/8
BUFFER 6	
BUFFER 7	
BUFFER 8	



(3) GENERAL NOTES:

MANUAL TUNING.

Manual tuning of the variometers is accomplished by holding the "MANUAL TUNE" switch (S4) in the upper position and turning the tuning motor shaft. The tuning motor shaft may be engaged by means of a tuning tool through a hole provided in the transmitter chassis (right side) (transmitter bottom cover must be off).

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

c. RF ALIGNMENT (Continued):

(3) GENERAL NOTES (Continued):

MANUAL BAND PRE-SELECTION

The transmitter may be turned ON with the band switch in any desired band position and without having the transmitter go through a retune cycle by manually holding the armature of relay K11 closed until the time delay relay operates.

MANUAL BAND CHANGING

The transmitter band switch may be rotated manually to any desired band position with the transmitter in "standby" condition. (The band switch shaft should be rotated only in a counter clockwise direction as viewed from the front panel) (The DPU Power Unit circuit breaker should be "OFF" while changing the transmitter band switch position as a safety precaution).

"OSC." and RF AMP ADJUSTMENTS.

The "OSC" and "RF AMP" adjustments provide broad band tuning of the RF exciter stages so that sufficient PA grid drive is obtained over each band. Broad band tuning is accomplished in each band by adjusting the "RF AMP" slug for optimum PA grid current at a frequency near the high end of the band and by adjusting the "OSC" slug for optimum PA grid current at a frequency near the low end of the band. Bands 1, 2 and 3 do not require broad band tuning. Band 4 requires an "RF AMP" adjustment only. Bands 5, 6, 7, 8 require both "RF AMP" and "OSC" adjustments. The "RF AMP" and "OSC" adjustments are not critical adjustments except on Band 8.

"BUFFER" ADJUSTMENTS,

Each band has a "BUFFER" adjustment whose primary purpose is to provide electrical tracking between the variometer tuned circuits. The "BUFFER" adjustment for each band is made according to one of the following procedures:(See pages 41A and 41B for reference).

PROCEDURE I.

For bands having a "sharp" buffer plate resonance curve (Bands 5, 7, and 8)

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

c. RF ALIGNMENT (Continued):

(3) GENERAL NOTES (Continued):

(a) Select a frequency near the high frequency end of the band, place the transmitter band switch on the correct band position and manually tune the variometers for maximum "RF OUT" meter reading.

(b) Leave the variometers in this position and tune the "BUFFER" adjustment for maximum "RF OUT".

(c) Manually retune the variometers for minimum "PA/MOD PLATE" current.*

(d) Retune the "BUFFER" adjustment for maximum "PA GRID" current.

PROCEDURE II.

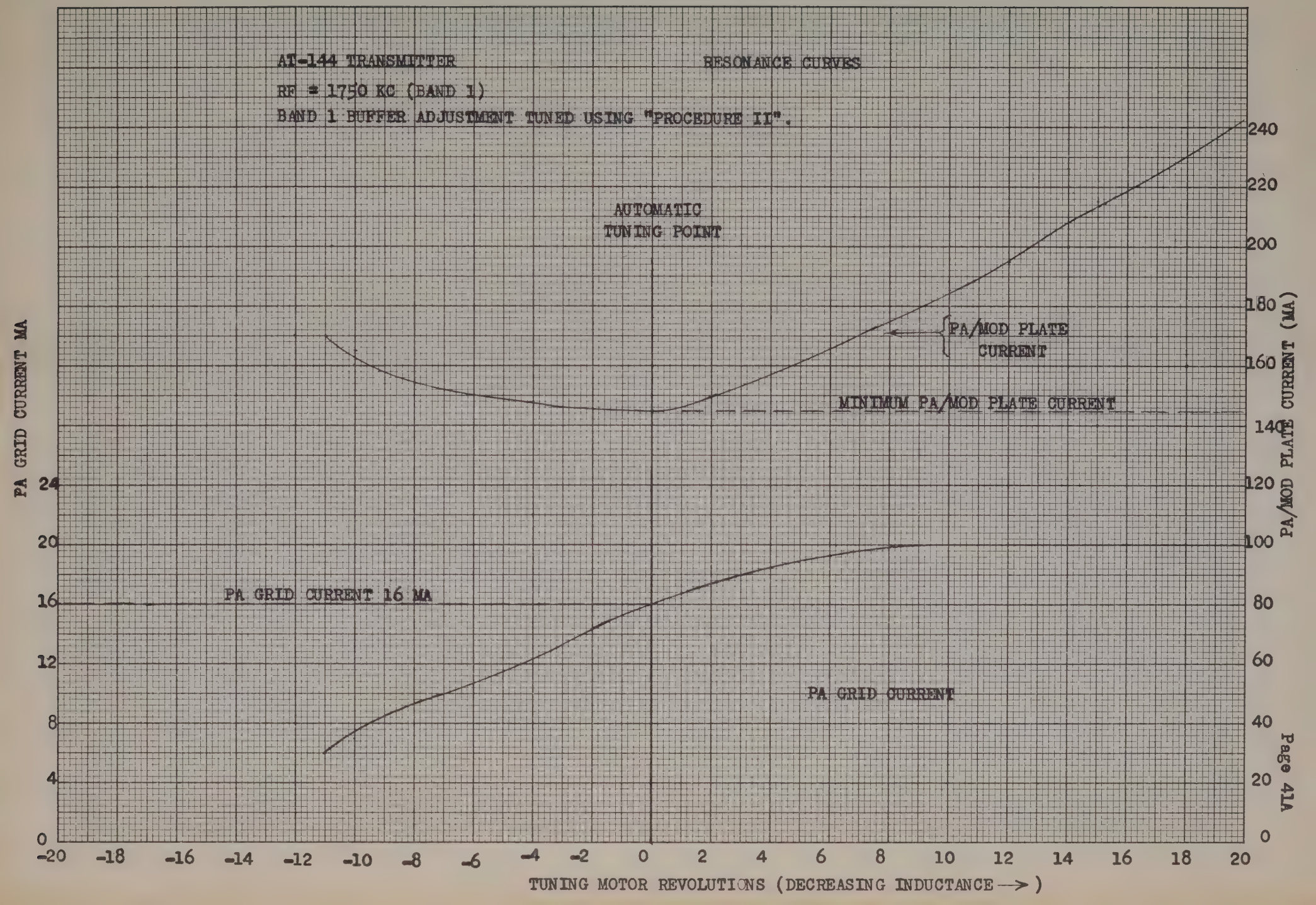
For bands having a "broad" buffer plate resonance curve (Bands 1, 2, 3, 4, and 6).

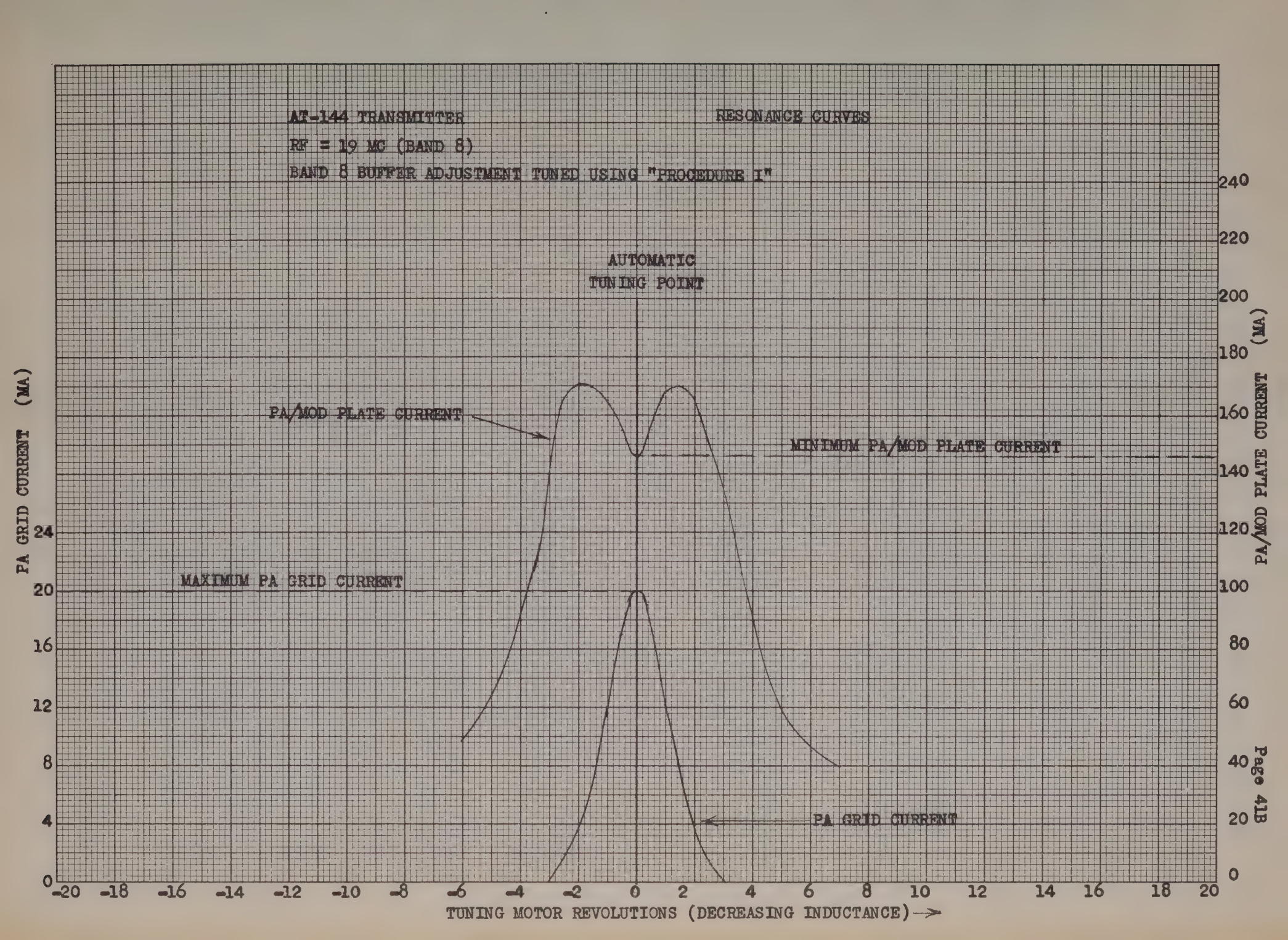
This procedure is the same as PROCEDURE I except for the following additional steps:

(e) (Bands 1, 2, 3, and 4). Retune the BUFFER adjustment on the low frequency side of resonance (by turning the slug inward) until the "PA GRID" current is 16 MA.

(e) (Band 6). Detune the BUFFER adjustment on the low side of resonance (by increasing the capacity) until the "PA GRID" current is 16 MA.

* NOTE: Bands 5, 6, 7 and 8 have a relatively "sharp" buffer plate resonance curve and a relatively "broad" PA plate resonance curve. For this reason, the minimum value of PA/MOD PLATE current is often difficult to determine. At any frequency where the PA/MOD PLATE current minimum is indefinite or hard to find, the variometers should be tuned for maximum "RF OUT" instead of for minimum PA/MOD PLATE current.


AT-144 TRANSMITTER
RESONANCE CURVES
RF = 1750 KC (BAND 1)
BAND 1 BUFFER ADJUSTMENT TUNED USING "PROCEDURE II".
AUTOMATIC
TUNING POINT
PA/MOD PLATE
CURRENT
MINIMUM PA/MOD PLATE CURRENT
PA GRID CURRENT 16 MA
PA GRID CURRENT
PA GRID CURRENT MA
PA/MOD PLATE CURRENT (MA)
TUNING MOTOR REVOLUTIONS (DECREASING INDUCTANCE —>)
0
4
8
12
16
20
24
0
20
40
60
80
100
120
140
160
180
200
220
240
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
20


AT-144 TRANSMITTER
RESONANCE CURVES
RF = 19 MC (BAND 8)
BAND 8 BUFFER ADJUSTMENT TUNED USING "PROCEDURE I"
AUTOMATIC
TUNING POINT
PA/MOD PLATE CURRENT
MINIMUM PA/MOD PLATE CURRENT
MAXIMUM PA GRID CURRENT
PA GRID CURRENT
PA GRID CURRENT (MA.)
PA/MOD PLATE CURRENT (MA.)
TUNING MOTOR REVOLUTIONS (DECREASING INDUCTANCE)
0
4
8
12
16
20
24
0
20
40
60
80
100
120
140
160
180
200
220
240
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
20

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):
1. ELECTRICAL ALIGNMENT (Continued):
o. RF ALIGNMENT (Continued):

(3) GENERAL NOTES (Continued):

BAND COVERAGE

Individual transmitter band coverages may deviate slightly from the nominal band coverages listed in Section III (Page 2). Each transmitter, however, should tune automatically at any frequency in the range 1.6 - 1.75 Mc (Band 1) or in the range 2.0 - 22.0 Mc (Bands 2-8).

P.A. OPERATING CHARACTERISTICS

At any frequency in the above tuning ranges, the transmitter (automatically tuning) should deliver 100 watts (or more) to a 52 ohm non-inductive, resistive dummy load and the PA/MOD PLATE current should not exceed 220 M.A. The P.A. plates should show no color.

(4) INDIVIDUAL BAND ALIGNMENT.

BAND 1.

(a) Select a 1750 KC external exciter frequency and allow the transmitter to tune automatically. The band switch should stop on "Band 1". Tune the Band 1 BUFFER adjustment using PROCEDURE II (See "BUFFER ADJUSTMENTS" above).

(b) Let the transmitter automatically tune again and note the P.A. GRID current. Adjust the "TUNING SENSI" control (located on the bottom of the main transmitter chassis) so that the transmitter automatically tunes and stops at a point where the PA GRID current is 16 MA. Rotate the "TUNING SENSI" control clockwise to increase (or counter-clockwise to decrease) the "PA GRID" current value at which the transmitter stops (automatic tuning). The "TUNING SENSI" control should be changed in small steps (approximately 10° rotation) and after each change, the transmitter should be allowed to automatically tune before noting the PA GRID current. It is important to note that the "TUNING SENSI" control does not change the PA GRID current directly but sets the value of PA GRID current to which the transmitter automatically tunes. A frequency of 1750 Kc is selected for adjusting the "TUNING SENSI" control because of the "broad" buffer plate resonance curve at this frequency.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):
1. ELECTRICAL ALIGNMENT (Continued):
c. RF ALIGNMENT (Continued):

(4) INDIVIDUAL BAND ALIGNMENT (Continued):

(c) Allow the transmitter to automatically tune at 1750 KC and 1600 KC and if necessary, retune the "Band 1" BUFFER adjustment for best P.A. efficiency (relative efficiency may be determined by noting the ratio of RF OUT to PA/MOD PLATE current).

BAND 8.

(a) Place the band switch on band "8".

(b) Manually tune the transmitter to frequencies of 15.5, 17, 18, 19, 20, 21, and 22 MC and tune the "Band 8" "RF AMP" and "OSC" adjustments for best PA GRID current throughout band 8. Usually the band 8 "RF AMP" adjustment is tuned for maximum PA GRID current at 21 MC and the Band 8 "OSC" adjustment is tuned for maximum PA GRID current at approximately 17 MC.

(c) Manually tune the transmitter for maximum PA GRID current at 19 MC. Loosen the set screw on the split gear attached to the PA plate variometer (L12) shaft (accessible at the bottom of the transmitter chassis) and manually tune the PA plate variometer (use the cam 04 as a tuning knob) for minimum PA/MOD PLATE current. With the variometers adjusted so that maximum PA GRID current and minimum PA/MOD PLATE current occur simultaneously, tighten the set screw on the PA plate variometer split gear. Place the DPU circuit breaker in the OFF position, operate the transmitter manual tune switch, turn the tuning motor shaft to bring the variometer to the minimum inductance position and check the physical alignment at the variometers. The angular position of the variometers should be the same (within approximately $\pm 2^{\circ}$).

(d) Allow the transmitter to automatically tune on frequencies of 15.5, 17, 18, 19, 20, 21 and 22 MC. The power output should be 100 watts (or more) and the PA/MOD PLATE current should not exceed 200 MA at any of the above frequencies except 22 MC (at 22 MC, the PA/MOD PLATE current may be as high as 220 MA).

NOTES: Band 8 "BUFFER" adjustment is usually not required and is disconnected when not required.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

c. RF ALIGNMENT (Continued):

(4) INDIVIDUAL BAND ALIGNMENT (Continued):

BAND 2.

(a) Place the band switch on Band 2 and manually tune the transmitter at 2.5 MC. Use PROCEDURE II for tuning the band 2 BUFFER adjustment.

(b) Let the transmitter automatically tune at 2.0 Mc and at the highest frequency it will tune without going to Band 3. If necessary, retune the Band 2 BUFFER Adjustment to give best P.A. efficiency at the high and low frequency ends of the band.

BAND 3.

(a) Place the band switch on Band 3 and manually tune the transmitter at 3.2 MC. Use PROCEDURE II for tuning the Band 3 BUFFER adjustment.

(b) Let the transmitter automatically tune at the lowest and at the highest frequency in Band 3. If necessary, retune the Band 3 BUFFER Adjustment for best P.A. efficiency at the ends of the band.

BAND 4.

(a) Place the band switch on Band 4 and manually tune the transmitter at 4.4 MC. Use PROCEDURE II for tuning the Band 4 BUFFER Adjustment.

(b) Let the transmitter automatically tune at the lowest and at the highest frequency in Band 4. If necessary, retune the Band 4 BUFFER Adjustment for best PA efficiency at the ends of the band.

BAND 5.

(a) Place the bandswitch on Band 5 and manually tune the transmitter at 6.0 MC. Use PROCEDURE I for tuning the Band 5 BUFFER Adjustment.

(b) Tune the Band 5 RF AMP and OSC Adjustments for most uniform PA GRID current throughout Band 5. (Manually tune the transmitter at 4.5, 5.0, 5.5 and 6.0 MC and note the maximum PA GRID current at each frequency).

(c) Let the transmitter automatically tune at the lowest and at the highest frequency in Band 5. If necessary retune the Band 5 BUFFER Adjustment for best PA efficiency at the ends of the band.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

c. RF ALIGHMENT (Continued):

(4) INDIVIDUAL BAND ALIGNMENT (Continued):

BAND 6

(a) Place the bandswitch on Band 6 and manually tune the transmitter at 9.2 MC. Use PROCEDURE II for tuning the Band 6 BUFFER Adjustment.

(b) Tune the Band 6 RF AMP and OSC Adjustments for most uniform PA GRID current throughout Band 6 (manually tune the transmitter at 6.0, 7.0, 8.0, 9.0 and 9.5 MC and note the maximum PA GRID current at each frequency).

(c) Let the transmitter automatically tune at the lowest and at the highest frequency in Band 6. If necessary retune the Band 6 BUFFER Adjustment for best PA efficiency at the ends of the Band.

BAND 7

(a) Place the bandswitch on Band 7 and manually tune the transmitter at 15.5 MC. Use PROCEDURE I for tuning the Band 7 BUFFER Adjustment.

(b) Tune the Band 7 RF AMP and OSC adjustments for most uniform PA GRID current throughout Band 7 (manually tune the transmitter at 9.5, 10, 11, 12, 13, 14, 15 and 15.5 MC and note the maximum PA GRID current at each frequency).

(c) Let the transmitter automatically tune at the lowest and at the highest frequency in Band 7. If necessary retune the Band 7 BUFFER Adjustment for best PA efficiency at the ends of the band.

(d) Tune the Band 7 RF AMP Adjustment so that the crossover frequency between Band 7 and Band 8 is 15.5 MC. Turn the Band 7 RF AMP tuning slug in to lower (or out to increase) the crossover frequency.

d. AUDIO ADJUSTMENTS

(1) BAND PASS FILTER INDUCTORS (L1 and L2)

L1 and L2 are identical variable audio inductors used in the low pass filter section of the audio unit (Z2). With the audio unit removed, the adjustments are accessible. The inductance may be varied by using a #8 Allen set screw key to turn a set screw located in the outside of each inductor.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT. (Continued):

d. AUDIO ADJUSTMENTS (Continued):

(1) L1 and L2 are factory adjusted and do not require further adjusting. If a new inductor is installed, the adjusting set screw should be turned all the way in and then turned out one-half turn. This adjustment provides rapidly increasing attenuation for audio frequencies above 3500 cps.
CAUTION: Do not leave the adjusting set screw all the way in.

(2) GAIN AND CLIPPER

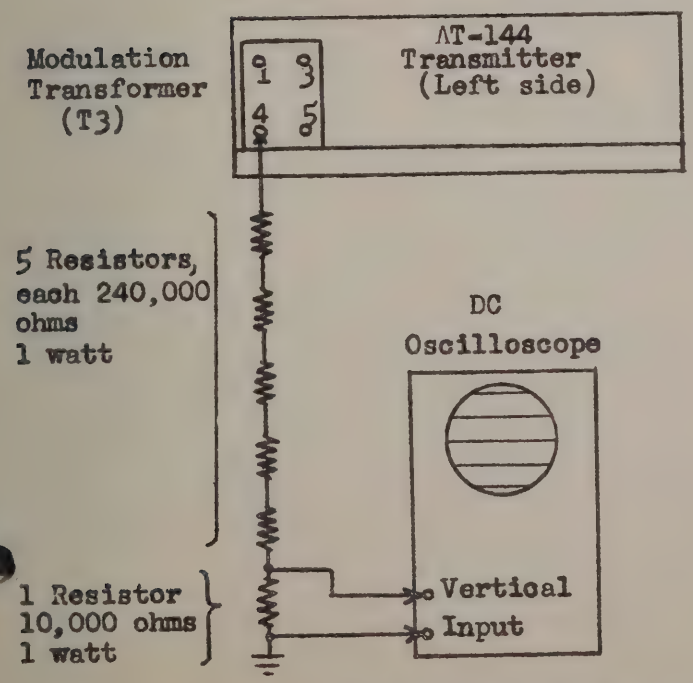
The "GAIN" and "CLIPPER" controls are located at the outside of the audio assembly (Z2) and are accessible with the transmitter "test covers" in place.

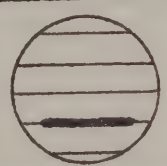
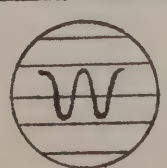
Clockwise rotation of the "GAIN" control increases the audio voltage at the grid of the speech amplifier (V6).

Clockwise rotation of the "CLIPPER" control increases the amount of audio clipping. With the CLIPPER control in its minimum (counter-clockwise) position, the audio peaks are clipped at approximately 120% modulation.

Use the following procedure to adjust the GAIN and CLIPPER controls.

(a) Provide a means for measuring the transmitter modulation (See TEST EQUIPMENT Section, Page 20). If a modulation monitor is not available, an oscilloscope having a D.C. amplifier presentation may be used as indicated in the following sketch.



Oscilloscope Pattern	Condition	Adjustments
	Transmitter OFF	Place line on 1 inch mark (use oscilloscope vertical centering control)
	Transmitter Carrier ON (No modulation)	Adjust oscilloscope "vertical gain" control for 1 inch upward deflection
	Transmitter carrier ON (100% modulation)	Adjust transmitter Audio "gain" control to give 100% modulation pattern (±0.9 inch deflection*)

* 100% modulation is ±0.9 inch deflection rather than ±1 inch due to Carrier regulation.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

1. ELECTRICAL ALIGNMENT (Continued):

d. AUDIO ADJUSTMENTS (Continued):

(2) GAIN AND CLIPPER (Continued):

(b) Let the transmitter automatically tune on the frequency at which the PA/MOD PLATE current is lowest. Usually this will be near the low frequency end of Band 7 (approximately 9.8 MC).

(c) Turn the CLIPPER control full counter-clockwise and the GAIN control full clockwise.

(d) Modulate the transmitter using a microphone having similar characteristics to the type used in service and rotate the CLIPPER control clockwise until the modulation peaks are just 100%. Tighten the locknut on the CLIPPER control.

(e) While talking into the microphone, rotate the GAIN control counter-clockwise until the modulation peaks start to drop below 100% modulation.

(f) Turn the DPU Power Unit circuit breaker OFF.

(g) Talk into the microphone again and observe the voltage at the speech amplifier (V6) grid (accessible at the rotor connection on the "GAIN" control) on an oscilloscope. Adjust the oscilloscope gain so that the peak to peak deflection is one inch.

(h) Rotate the transmitter GAIN control clockwise until the oscilloscope deflection is 2.5 inches.

(i) Tighten the locknut on the GAIN control.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

2. TROUBLE-SHOOTING AIDS.

a. Typical tube socket voltages (meter sensitivity = 20,000 ohms/volt).

Conditions: RF Carrier = 6.5 MC, No modulation
27.5 V DC input to transmitter

TUBE	ELEMENT	MEASURED AT POINT	DC VOLTS TO CHASSIS
V1 Oscillator (5654)	Filament	Pin 3	0.0
	Filament	Pin 4	6.3
	Cathode	Pin 7	40.0
	Screen Grid	Pin 6	120.0
	Plate	Pin 5	152.0
V2 RF Amplifier (6146)	Filament	Pin 2	0.0
	Filament	Pin 7	6.3
	Cathode	Pin 1	0.0
	Grid	R15-R16 Junction	-18.0
	Screen Grid	Pin 3	85.0
	Plate	C26 Terminal	425.0
V3 Buffer (6146)	Filament	Pin 2	6.3
	Filament	Pin 7	12.6
	Cathode	Pin 4	0.0
	Grid	R15-R16 Junction	-18.0
	Screen Grid	Pin 3	85.0
	Plate	L4-C27 Junction	425.0
V4 P.A. (4-65A)	Filament	Pin 1	12.0
	Filament	Pin 7	6.0
	Grid	L5-C20 Junction	-155.0 *
	Screen Grid	Pin 2	190.0
V5 P.A. (4-65A)	Filament	Pin 1	0.0
	Filament	Pin 7	6.0
	Grid	L5-C20 Junction	-155.0 *
	Screen Grid	Pin 2	190.0
V6 Speech Amplifier (5654)	Filament	Pin 3	12.6
	Filament	Pin 4	6.3
	Cathode	Pin 2	1.35
	Screen Grid	Pin 6	65.0
	Plate	Pin 5	73.0
V7 Clipper (5726)	Filament	Pin 3	6.3
	Filament	Pin 4	0.0
	Plate 1	Pin 7	**
	Cathode 1	Pin 1	15.8
	Plate 2	Pin 2	0.0

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

2. TROUBLE-SHOOTING AIDS (Continued):

a. Typical tube socket voltages (continued):

TUBE	ELEMENT	MEASURED AT POINT	DC VOLTS TO CHASSIS
V8 Audio Driver	Filament	Pin 3	18.9
	Filament	Pin 4	12.6
	Cathode	Pin 2	12.5
	Screen Grid	Pin 6	238.0
	Plate	Pin 5	230.0
V9 Modulator (811A)	Filament	Pin 1	18.3
	Filament	Pin 4	24.6
	Grid	Pin 3	18.3
V10 Modulator (811A)	Filament	Pin 1	12.0
	Filament	Pin 4	18.3
	Grid	Pin 3	12.0

* With PA GRID current 21 MA (Voltage is -105 to -110 volt with no RF excitation).

** Varies 0.3 to 0.9 volts depending on average % modulation.

b. Typical Meter Readings.

Conditions: 27.5 V Input to transmitter
Transmitter tuning automatically

		"BATT"	PA/MOD HV	PA/MOD PLATE	PA GRID	RF OUT*
BAND 1 1600 KC	Meter Indication MA	0.55	0.78	0.3	0.533	0.47
	Actual Indicated Value	27.5 V	1170 V	150 MA	16 MA	71 V
BAND 6 6.5 MC	Meter Indication MA	0.55	0.78	0.36	0.60	0.43
	Actual Indicated Value	27.5 V	1170 V	180 MA	18 MA	65 V
BAND 8 22 MC	Meter Indication MA	0.55	0.78	0.38	0.50	0.28
	Actual Indicated Value	27.5 V	1170 V	190 MA	15 MA	42 V

* "RF OUT" Meter reading is for relative use only and is not to be used as an absolute indication of power output. The "RF OUT" indication is most accurate at 1.6 MC, the accuracy decreasing with increasing frequency.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

2. TROUBLE-SHOOTING AIDS (Continued):

c. Trouble Symptoms.

NOTE: All part symbols refer to AT-144 TRANSMITTER unless otherwise specified.

SYMPTOM	PROBABLE CAUSE(S)
(1) Nothing happens after transmitter has been turned ON more than 2 minutes	- "CONTROLS" Fuse blown. - Defective time delay relay (TD1)
(2) Transmitter wont tune. (Turns off after trying to tune on each band).	- No crystal (External frequency selector incorrectly positioned). -DPU Circuit breaker "OFF" -DPU "HV" fuse blown. -"TUNING SENSI" control incorrectly adjusted. -Bias voltage too high -Weak OSCILLATOR; RF AMP, or BUFFER Tube
(3) Manual tuning of transmitter produces no PA GRID current	- Same as (2) above - Band switch not positioned correctly
(4) Transmitter starts to re-channel, tuning motor runs but variometers don't turn	- External frequency selector switch incorrectly positioned. - Open circuit in crystal selector relay circuit (K5-K10)
(5) Crystal drum turns continually	- Short between wires in re-entrant circuit (External frequency selector)
(6) Sequence solenoid rotates continually	- Bias winding on K4 (terminals 1-8) not energized. - K4 defective.
(7) Blower motor doesn't run when PA and modulator tube filaments are energized	- K3 defective. - Blower motor brushes sticking.
(8) PA and modulator filaments not energized during transmitter re-tune cycle	- K3 defective. - Open filament on one of the PA or modulator tubes.

XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

2. TROUBLE-SHOOTING AIDS (Continued):

c. Trouble Symptoms (continued):

SYMPTOM	PROBABLE CAUSE(S)
(9) Transmitter tunes and stops. PA Grid current OK. No RF output (or low output). PA plates red.	- Defective PA plate tuning or loading capacitor.
(10) Transmitter tunes but consistently on "FINAL TUNE" positions "2" or "3"	- Weak OSCILLATOR, RF AMP. or BUFFER tube. - Bias voltage too high. - "TUNING SENSI" control incorrectly adjusted.
(11) Transmitter starts to re-tune, variometers turn, bandswitch doesn't operate	- Defective microswitch (MS1). - Microswitch (MS1) incorrectly positioned.

d. Test Panel.

To facilitate transmitter/power unit/antenna tuner checks, the bench "TEST PANEL" should provide external control circuits as shown on Drawing D-953-8. The following additional test switches are recommended for the bench "TEST PANEL":

(1) POWER ON-OFF.

(2) DC Voltmeter (0-50 volts DC) to give an accurate indication of input volts to the system.

(3) P-T switch (single pole, single throw toggle switch). Connect between the microphone press-to-talk connection and ground. This switch provides locked press-to-talk operation with no modulation.

(4) RE-CHANNEL. (SPST momentary pushbutton switch, contacts normally closed) connect in series with the ground return on the external frequency selector switch (crystal bank selector section). This switch provides a simple means for re-channeling the transmitter for test purposes.

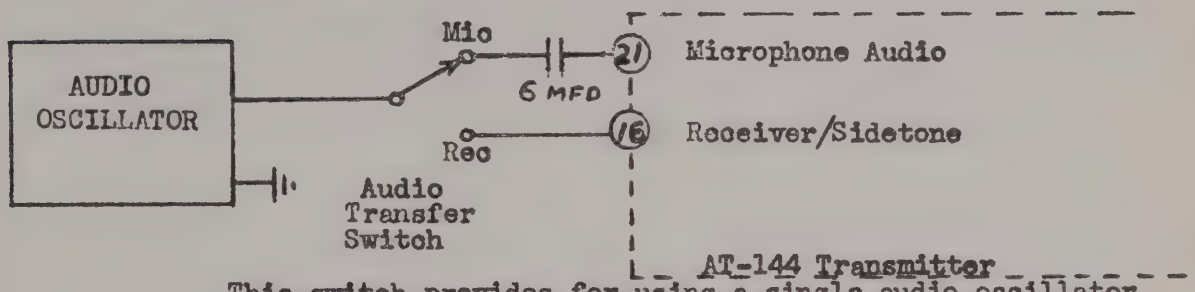
XII. AT-144 TRANSMITTER MAINTENANCE (Continued):

E. ELECTRICAL ADJUSTMENTS AND MAINTENANCE (Continued):

2. TROUBLE-SHOOTING AIDS (Continued):

d. Test Panel (Continued):

(5) AUDIO TRANSFER (Single pole - double throw) -connect as follows:



This switch provides for using a single audio oscillator to simulate either a microphone or a receiver audio output for test purposes.

e. Trouble Isolation.

Usually electrical troubles may be quickly classified as RF, Audio or Control Circuit troubles. Plug in components, such as vacuum tubes, time delay relay (TD1), and automatic tuning control relay (K4) may be replaced with new components to further isolate individual troubles. The Audio Assembly (Z2), the control relay assembly (Z3), the drum control switch assembly (Z5), and the band solenoid assembly (Z4) may be individually disconnected to facilitate isolation of control circuit troubles.

NOTE: Simplified schematics of individual power supply, RF, and control circuits are shown in the "ELECTRICAL DESCRIPTION" section (See INDEX for page numbers) and should be useful in making individual circuit continuity checks.

XIII. DPU DYNAMOTOR POWER UNIT MAINTENANCE

A. DYNAMOTOR

The dynamotor contains three sets of brushes. The 27.5 volt commutator is located at the rear end of the dynamotor. The 400 volt commutator is located at the front end of the dynamotor with the 750 volt commutator adjacent to and just back of it.

The dynamotor should be removed and inspected at regular intervals (The dynamotor may be removed after disconnecting the five terminal board connections and removing the four mounting bolts which secure the dynamotor to its mounting brackets). Each brush should be checked for wear and replaced if the brush is less than 1/4 inch long. Use compressed air to remove copper dust from the commutators.

B. VIBRATOR

The vibrator is a hermetically sealed octal plug-in unit and requires no maintenance. A vibrator which fails to vibrate (with the DPU circuit breaker ON) or appears to be otherwise defective, should be replaced with a new unit.

C. RELAYS

Relays should be inspected at regular intervals. Check the relays for proper alignment, follow through, pitting and corrosion. Use a burnishing tool (Western Electric #265B or equivalent) for cleaning the contacts.

1. DYNAMOTOR START RELAY.

The dynamotor start relay (K1) is a solenoid type relay, located above the DPU chassis on the back of the front panel. The relay terminals and contacts are accessible with the DPU top dust cover removed. Relay coil characteristics are as follows:

Resistance.....80 ohms

Minimum volts D.C. required to operate relay.....21

Nominal operating volts D.C. in DPU 27.5 V

2. BIAS INTERLOCK RELAY (K2)

Bias interlock relay (K2) is located on the bottom of the DPU chassis. Contacts and terminals are accessible with the DPU bottom cover removed. Characteristics are as follows:

Coil Resistance.....680 ohms

Closing Current.....18 to 22 MA D.C.

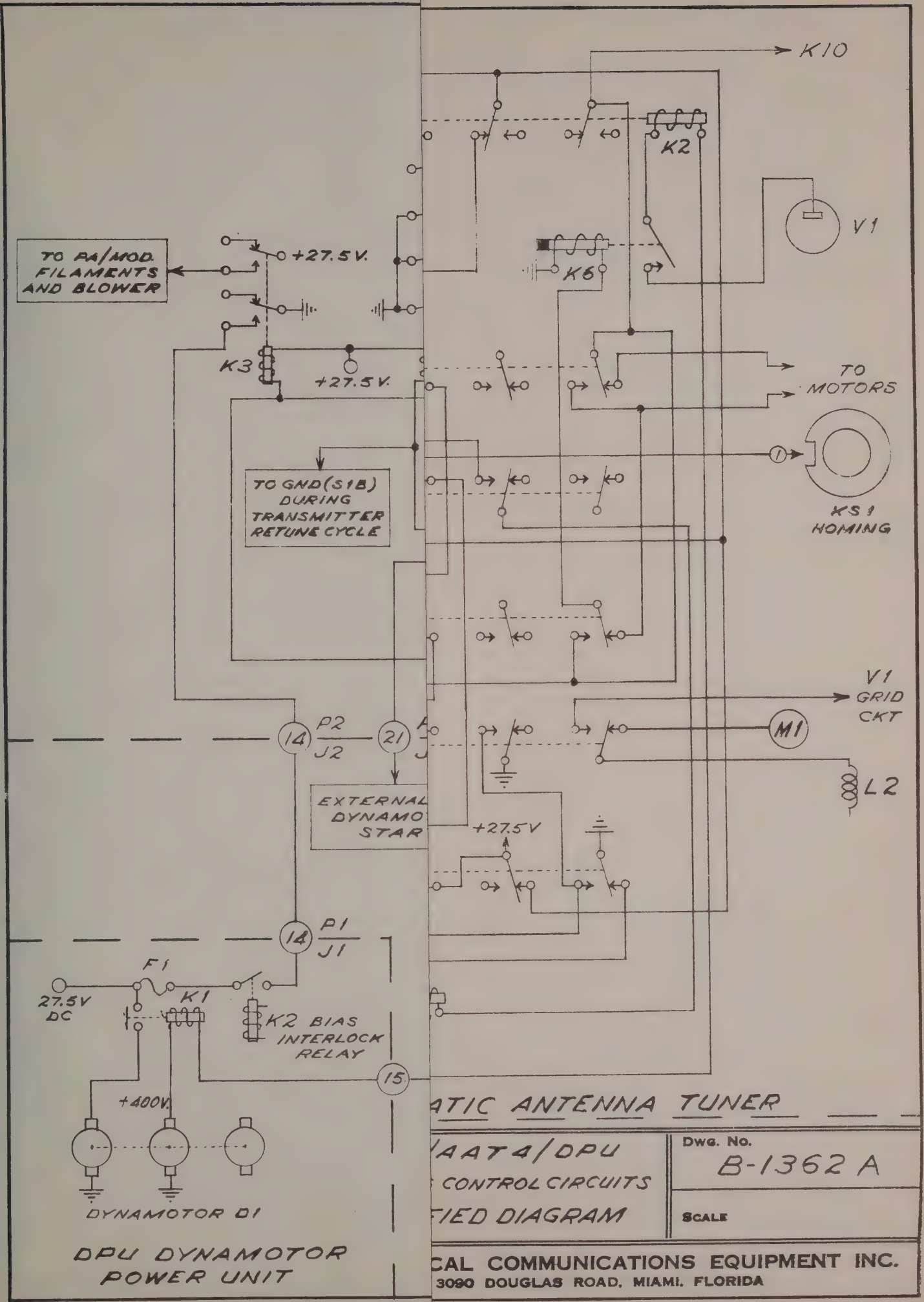
XIII. DPU DYNAMOTOR POWER UNIT MAINTENANCE (Continued):

D. BIAS VOLTAGE:

The bias voltage at the DPU output terminal (P1, pin 25) should be in the range 105-110 volts D.C. negative.

NOTE: D.C. input to the DPU should be 27.5 volts and the AT-144 transmitter bias circuit should be connected when making a bias voltage check. An accurate D.C. voltmeter should be used.

XIV. SERVICE NOTES


K10
K2
V1
TO PA/MOD. FILAMENTS AND BLOWER
+27.5V.
K6
K3
+27.5V.
TO MOTORS
TO GND(S1B) DURING TRANSMITTER RETUNE CYCLE
KS1 HOMING
V1 GRID CKT
M1
L2
14
P2
J2
21
EXTERNAL DYNAMO STAR
+27.5V
14
P1
J1
F1
27.5V DC
K1
K2 BIAS INTERLOCK RELAY
15
+400V.
DYNAMOTOR D1
DPU DYNAMOTOR POWER UNIT
ATIC ANTENNA TUNER
/AAT4/DPU
CONTROL CIRCUITS
FIED DIAGRAM
Dwg. No.
B-1362 A
SCALE
CAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

TO PA/MOD. FILAMENTS AND BLOWER

+27.5V.

K3

+27.5V.

K21

+27.5V

K1 KEYING RELAY

23

EXTERNAL CW KEY

SPEECH AMPLIFIER V6 (5654)

R32 390Ω

AUDIO UNIT Z2

6 P3 J3

TO GND (S1B) DURING TRANSMITTER RETUNE CYCLE

TO GND DURING TRANSMITTER RETUNE CYCLE

P1 27 J1 RETUNE

10

K15

+27.5V.

14 P2 J2

21 P1 J1

EXTERNAL (CW) DYNAMOTOR START

CAUSES SEQUENCE SW. (S1) TO GO TO "OFF" WHEN ENERGIZED

20 TIME DELAY CUT OFF 12

26 XMTR HOLD & AF MUTING 9

30 TIME DELAY PROTECT 11

A2 +400V. 16

R9 750Ω

14 P1 J1

F1

27.5V DC

K1

K2 BIAS INTERLOCK RELAY

15

A1

+400V.

DYNAMOTOR D1

DPU DYNAMOTOR POWER UNIT

AT-144 TRANSMITTER

P1 J1 22

EXTERNAL PRESS-TO-TALK

K10

K2

V1

K6

K3

TO MOTORS

1

K7

+27.5V.

KS1 HOMING

K1

V1 GRID CKT

M1

K8

L2

+27.5V

+27.5V.

K5

K4

+27.5V.

AAT4 AUTOMATIC ANTENNA TUNER

DESIGN	NAME	DATE
DRAWN	RK	9-8 '54
CHECKED		
APPROVED	WNE	11-23 54

AT-144/AAT4/DPU
INTERLOCKING CONTROL CIRCUITS
SIMPLIFIED DIAGRAM

DWG. NO. B-1362 A

SCALE

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

SHEET 1 - 2/4-

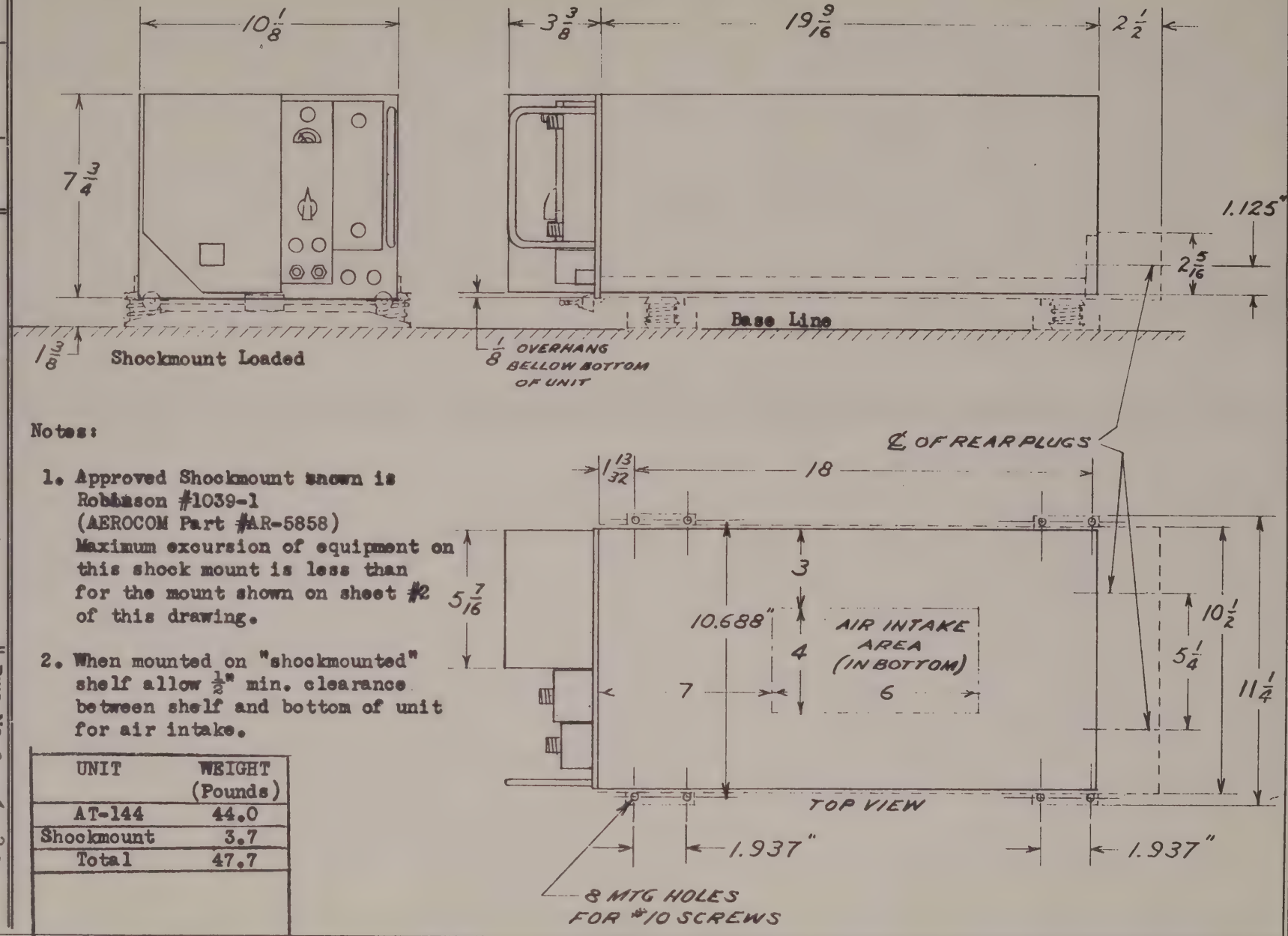
	DESIGN	NAME	DATE
DRAWN	PK		5.9.53
CHECKED	WNO		5-9-53
APPROVED			

MODEL AT-144
HF TRANSMITTER
OUTLINE DIMENSIONS

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

DWG. NO. SHEET 1 OF 2 SHEETS
A-886-3

SCALE 3/16 IN. = 1 IN.

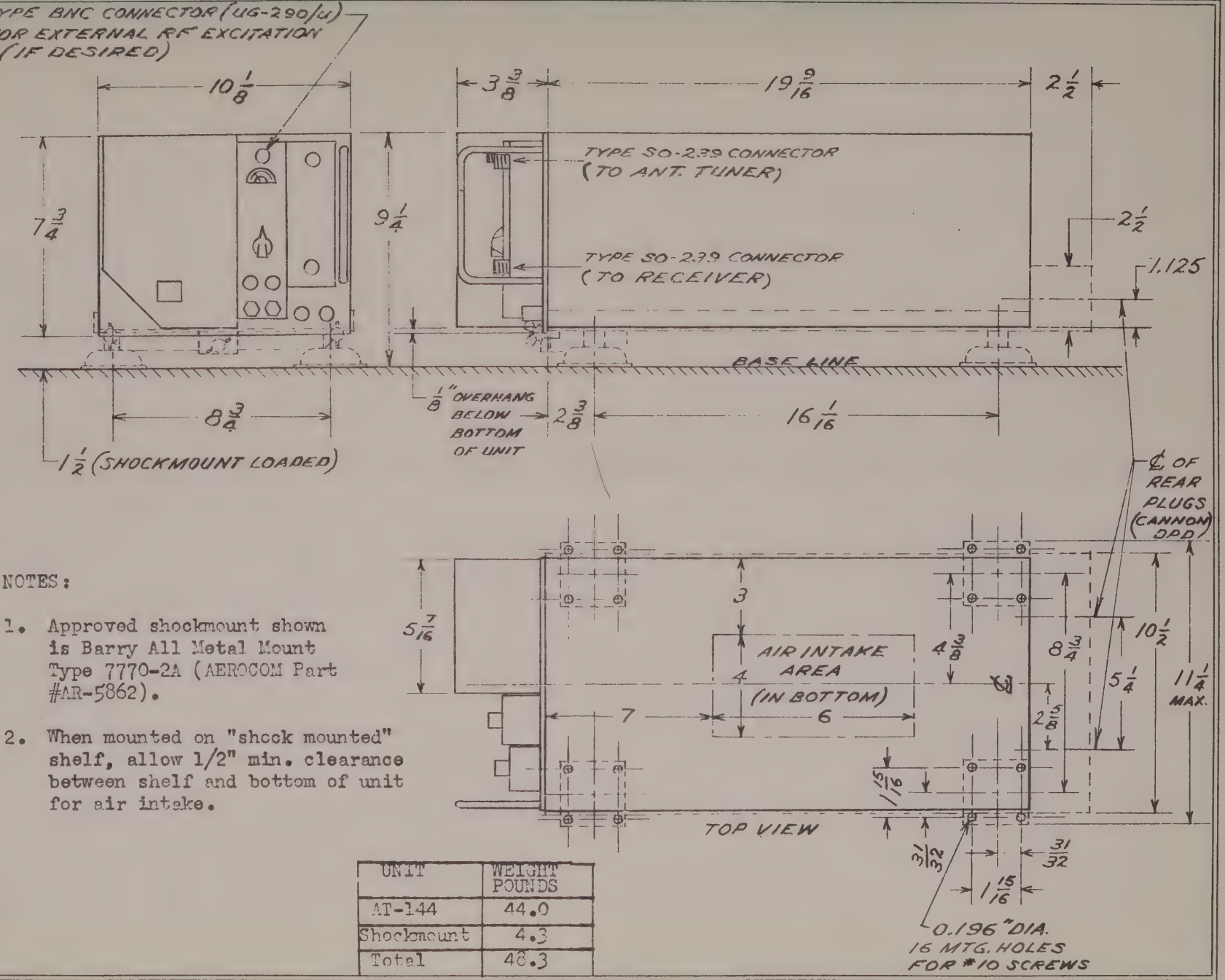


Notes:

1. Approved Shockmount shown is Robinson #1039-1 (AEROCOM Part #AR-5858) Maximum excursion of equipment on this shock mount is less than for the mount shown on sheet #2 of this drawing.

2. When mounted on "shockmounted" shelf allow $\frac{1}{2}$" min. clearance between shelf and bottom of unit for air intake.

UNIT	WEIGHT (Pounds)
AT-144	44.0
Shockmount	3.7
Total	47.7



NOTES:

1. Approved shockmount shown is Barry All Metal Mount Type 7770-2A (AEROCOM Part #AR-5862).

2. When mounted on "shock mounted" shelf, allow 1/2" min. clearance between shelf and bottom of unit for air intake.

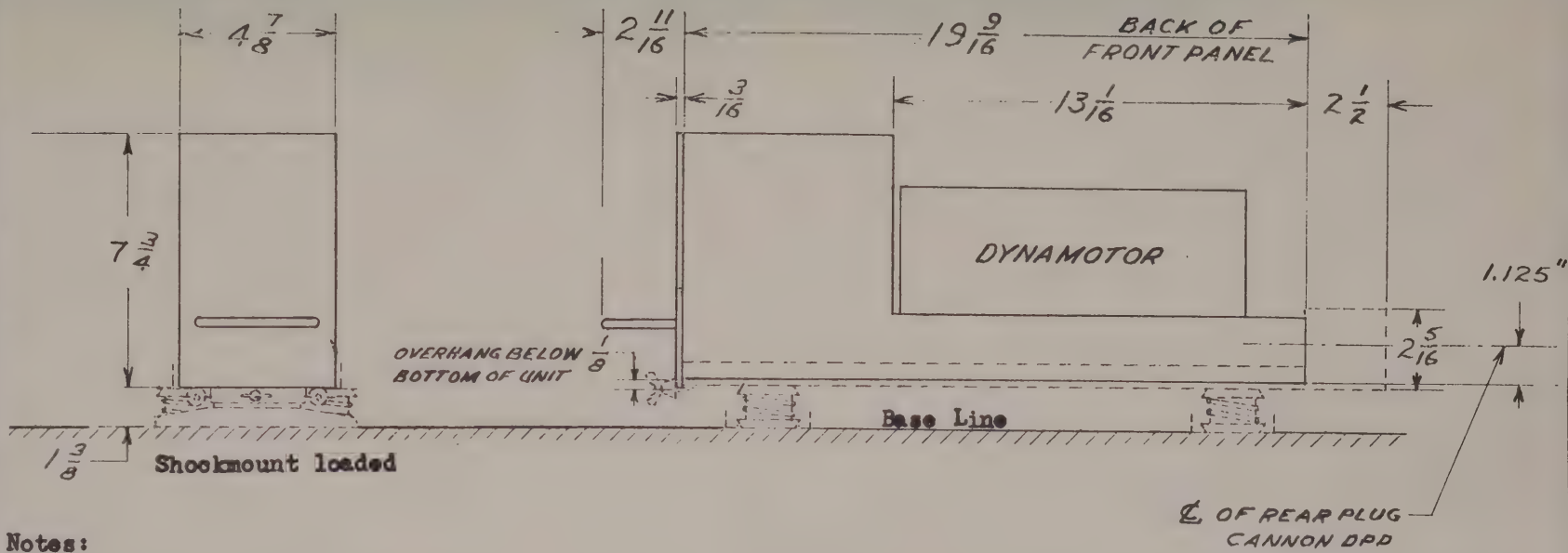
UNIT	WEIGHT POUNDS
AT-144	44.0
Shockmount	4.3
Total	48.3

	NAME	DATE
DESIGN		
DRAWN	R.K.	5-23-53
CHECKED	R.D.S.	5-23-53
APPROVED		

MODEL AT-144
HF TRANSMITTER
OUTLINE DIMENSIONS

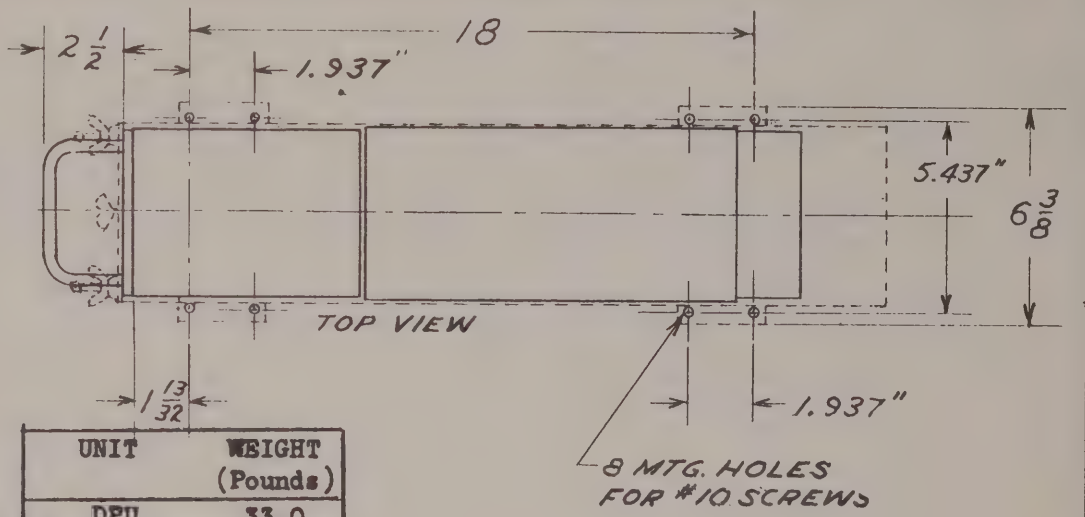
DWG. NO. SHEET 2 OF 2 SHEETS
A-886-3
SCALE 3/16 IN. = 1 IN.

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA



Notes:

1. Approved shockmount shown is Robinson #1040-1 (AEROCOM Part #AR-5859) Maximum excursion of equipment on this shockmount is less than for the mount shown on sheet #2 of this drawing.



UNIT	WEIGHT (Pounds)
DPU	33.0
Shockmount	2.7
Total	35.7

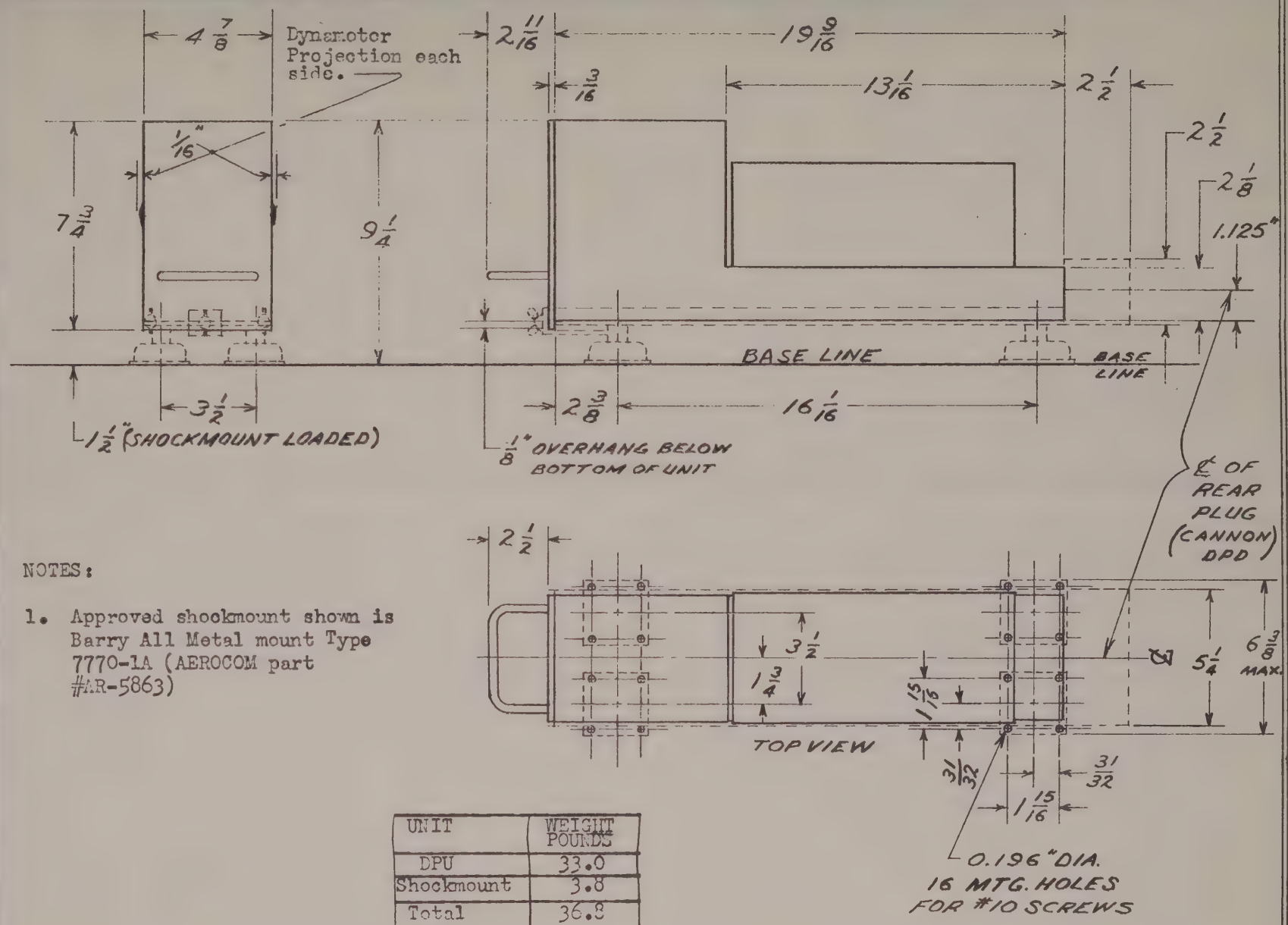
	NAME	DATE
DESIGN		
DRAWN	PK	5-9-53
CHECKED	[illegible]	5-9-53
APPROVED		

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

MODEL DPU
DYNAMOTOR POWER UNIT
OUTLINE DIMENSIONS

Dwg. No. Sheet 1 of 2 Sheets
A-887-3

SCALE 3/16 IN. = 1 IN.



NOTES:

1. Approved shockmount shown is Barry All Metal mount Type 7770-1A (AEROCOM part #AR-5863)

UNIT	WEIGHT POUNDS
DPU	33.0
Shockmount	3.8
Total	36.8

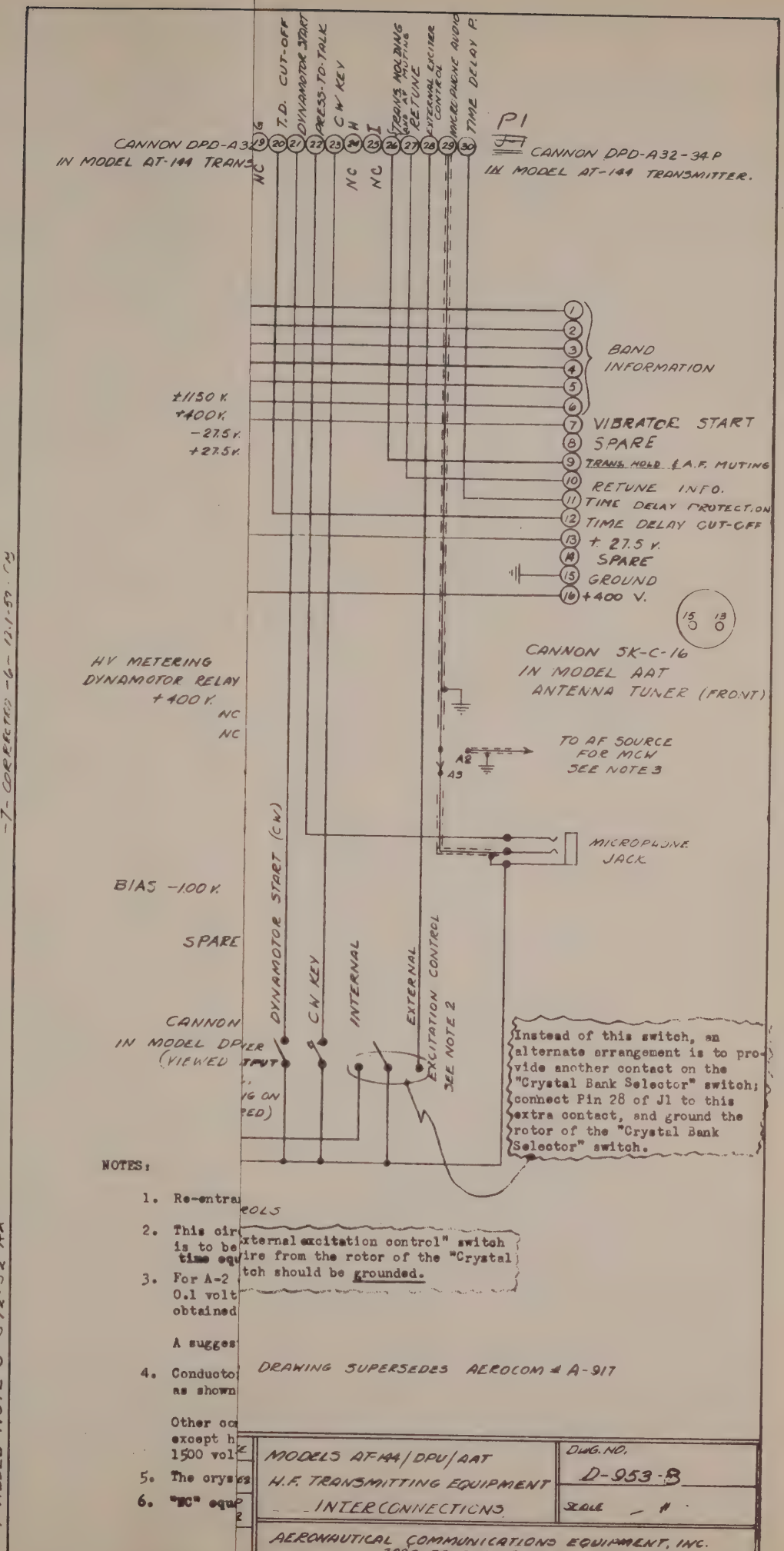
	NAME	DATE
DESIGN		
DRAWN	RK	5-23-53
CHECKED	R/DS	5-23-53
APPROVED		

MODEL DPU
DYNAMOTOR POWER UNIT
OUTLINE DIMENSIONS

DWG. NO. A-887-3 SHEET 2 OF 2 SHEETS

SCALE 3/16 IN = 1 IN.

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA



-6 CORRECTED INT.-EXT. SW. CIRCUIT - 11-26-52 - CB
-5 REMOVED GROUNDS FROM PINS #'S & 17 DPU CANNON PLUG 9-18-52 RA
-4 DELETED [illegible] INTERLOCK [illegible] 7-22-52 MWC
-3 CHANGED A1 PIN FROM LH SIDE TO RH SIDE OF DPD CONNECTOR 5-28-52 RA
-2 DELETED POWER ON-OFF SW. 4-15-52 RA
-1 ADDED NOTE 5 3-12-52 RA

-8 Added [illegible] Terminals & Excitation control "Switch" 12-13-52.
-7 CORRECTED -6 - 12-1-52 CG

-6 CORRECTED INT.-EXT. SW. CIRCUIT - 11-26-52 - CO
-5 REMOVED GROUNDS FROM PINS #'S 17 OF DPU CANNON PLUG 9-19-52 RA
-4 DELETED BIAS INTERLOCK [illegible] VIBRATOR START 7-21-52 MWC
-3 CHANGED A1 PIN FROM LH SIDE TO RH SIDE OF DPU CONNECTOR 5-28-52 RA
-2 DELETED POWER ON OFF SW. 4-15-52 RA
-1 ADDED NOTE 5 5-12-52 RA

P2

CANNON DPD-A32-34P
IN MODEL AT-144 TRANSMITTER

+1150 V. · +400 V. · GROUND · +27.5 V. (FILS.) · BAND INFORMATION · SPARE · VIB. START · -100 V. BIAS · HV METERING · DYNAMOTOR RELAY · SPARE · NC · +27.5 V. (CONTROL) · SPARES

A1 A2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

+1150 V. (A1)
+400 V. (A2)
-27.5 V. (1)
+27.5 V. (2)

30 AMPS · 7 AMPS · 3 AMPS · 5 AMPS

SEE NOTE 4

+27.5 VOLTS
-27.5 VOLTS (GROUND)

30 AMPS

HV METERING DYNAMOTOR RELAY (13)
+400 V. (14)
NC (15)
NC (16)

BIAS -100 V. (25)
SPARE (28)

A10

CANNON DPD-A 32-34P
IN MODEL DPU POWER UNIT
(VIEWED FROM REAR)

AT-144 TRANSMITTER
(VIEWED FROM REAR)

P1 A10 · P2 A10

+400 V. · +400 V. · GROUND · SPARE · CRYSTAL SELECTION · AF RETURN · RECEIVE/SIDE TONE · RECEIVER AUDIO · NC · NC · T.D. CUT-OFF · DYNAMOTOR START · PRESS-TO-TALK · C.W. KEY · NC · NC · TRANS. HOLDING & A.F. MUTING · RETUNE · EXTERNAL EXCITER CONTROL · MICROPHONE AUDIO · TIME DELAY P.

A1 A2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 27 23 24 25 26 27 28 29 30

P1

CANNON DPD-A32-34P
IN MODEL AT-144 TRANSMITTER.

1 BAND INFORMATION
2
3
4
5
6
7 VIBRATOR START
8 SPARE
9 TRANS. HOLD & A.F. MUTING
10 RETUNE INFO.
11 TIME DELAY PROTECTION
12 TIME DELAY CUT-OFF
13 + 27.5 V.
14 SPARE
15 GROUND
16 +400 V.

15 13 / 16

CANNON 5K-C-16
IN MODEL AAT
ANTENNA TUNER (FRONT)

TO AF SOURCE FOR MCW SEE NOTE 3

A2 A3

MICROPHONE JACK

SPGT NON-SHORTING SEE NOTE 6

SEE NOTE 1

CRYSTAL DRUM POSITION SELECTOR (SHOWN ON POS. 24)

CRYSTAL BANK SELECTOR

PHONES JACK

TO RECEIVER AUDIO OUTPUT TERMINAL, (IF MUTING ON A-3 DESIRED)

DYNAMOTOR START (C.W.)

C.W. KEY

INTERNAL

EXTERNAL EXCITATION CONTROL SEE NOTE 2

Instead of this switch, an alternate arrangement is to provide another contact on the "Crystal Bank Selector" switch; connect Pin 28 of J1 to this extra contact, and ground the rotor of the "Crystal Bank Selector" switch.

REMOTE CONTROLS

If the "Internal-External excitation control" switch is not used, the wire from the rotor of the "Crystal Bank Selector" switch should be grounded.

NOTES:

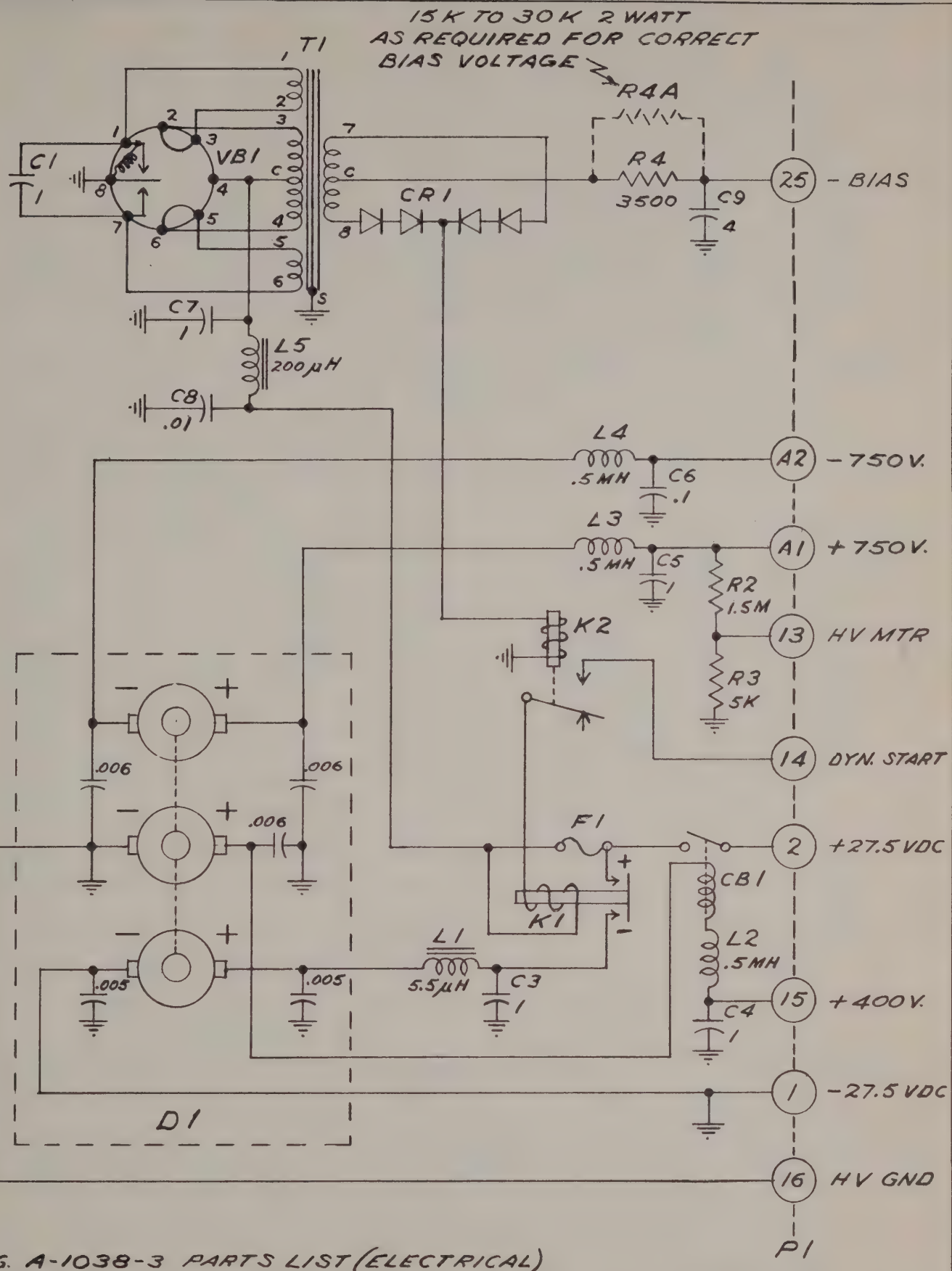
1. Re-entrant type switch wafer. See ARINC Characteristic No. 524.
2. This circuit not required unless an external RF exciter (such as FSK Radio Teletype) is to be used. If switch used, it must be 2 position type and have "break before make" time equal to or greater than for the "Crystal Bank Selector" switch.
3. For A-2 emission (MCW), an A.F. Voltage, adjustable in amplitude up to approximately 0.1 volt RMS, must be used for modulating the transmitter. This voltage may be obtained from an A.F. oscillator, or from the 400 cycle aircraft power supply.

   A suggested circuit for the oscillator is shown on AEROCOM Dwg. S-576.
4. Conductor sizes for 27.5 volt circuits must be ample for continuous current values, as shown. Suitable protection for these conductors should be provided.

   Other conductor sizes may be #18 or #20 AWG. Insulation - standard 600 volt for all except high voltages as shown. The H.V. conductors must be insulated for at least 1500 volts, continuous.
5. The crystal bank selector switch wafer, SP6T, must be non-shorting.
6. "NC" equals "No Connection".

THIS DRAWING SUPERSEDES AEROCOM # A-917

DESIGN	NAME	DATE	MODELS AT-144/DPU/AAT H.F. TRANSMITTING EQUIPMENT - INTERCONNECTIONS	DWG. NO. D-953-B
DRAWN	C.W.O.	2-14-52		SCALE - #
CHECKED	WHB	3-10-52		
APPROVED			AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC. 3090 DOUGLAS RD. MIAMI, FLA., U.S.A.	



-4 ADD R4A NOTE 11/11/53 HDS
-5 ADD MODIF. "B" 8/11/54 RK
NOTE; REDRAWN 9/10/54 RK

-3 ADDED "F3" 3/23/53 CB -MODIF. "A"
-2 REMOVED R-1 & C-3 11/25/52 FWS
-1 CORRECTED TO DATE 2/28/52 RK

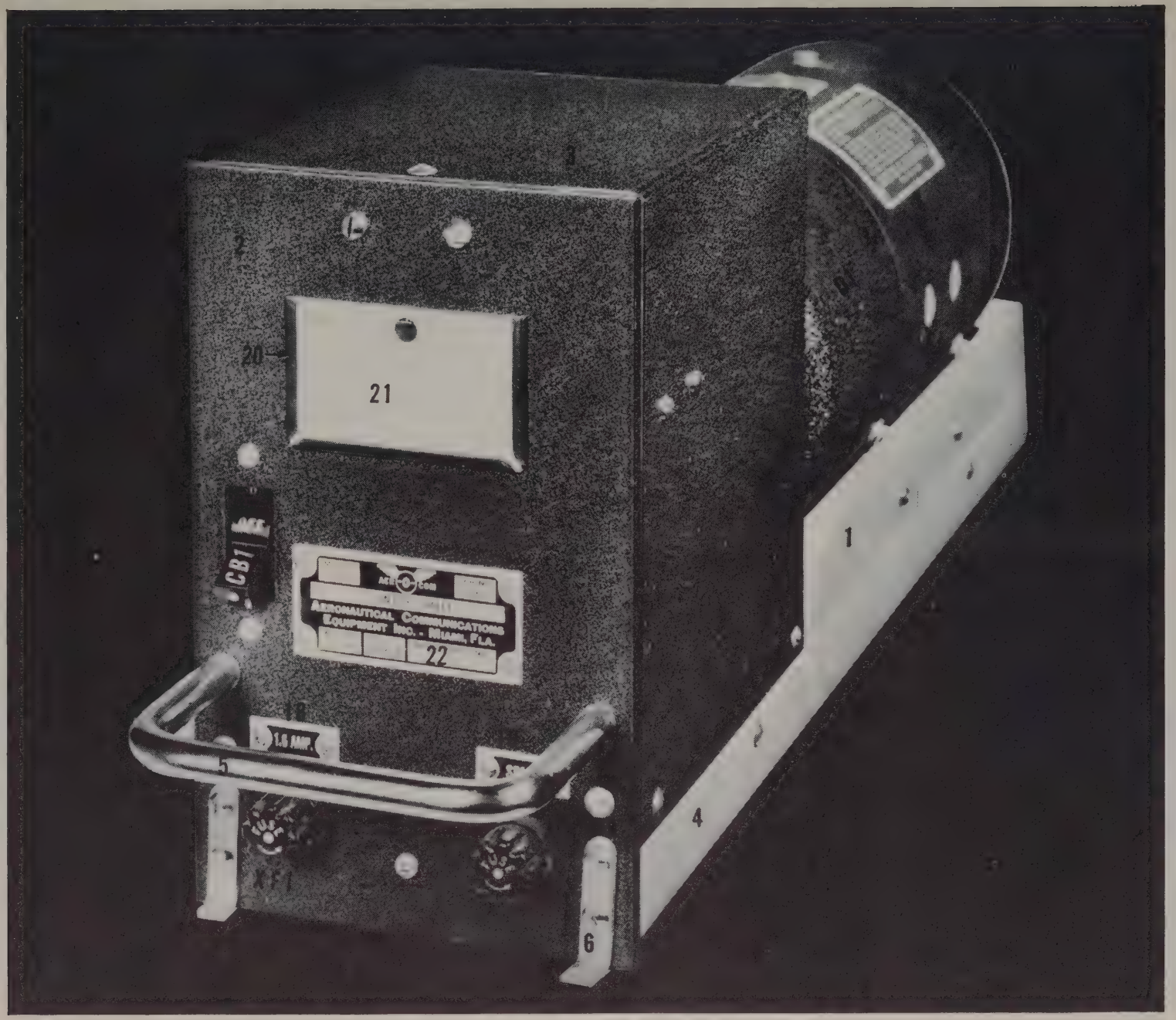
DWG. A-1038-3 PARTS LIST (ELECTRICAL)

DESIGN	NAME	DATE	DYNAMOTOR POWER UNIT WITH MODIFICATION "B" SCHEMATIC DIAGRAM	DWG. NO. DPU #16-5
DRAWN	RK	9-10 '54		SCALE ———
CHECKED		9-10 '54		
APPROVED			AERONAUTICAL COMMUNICATIONS EQUIPMENT INC. 3090 DOUGLAS ROAD, MIAMI, FLORIDA	

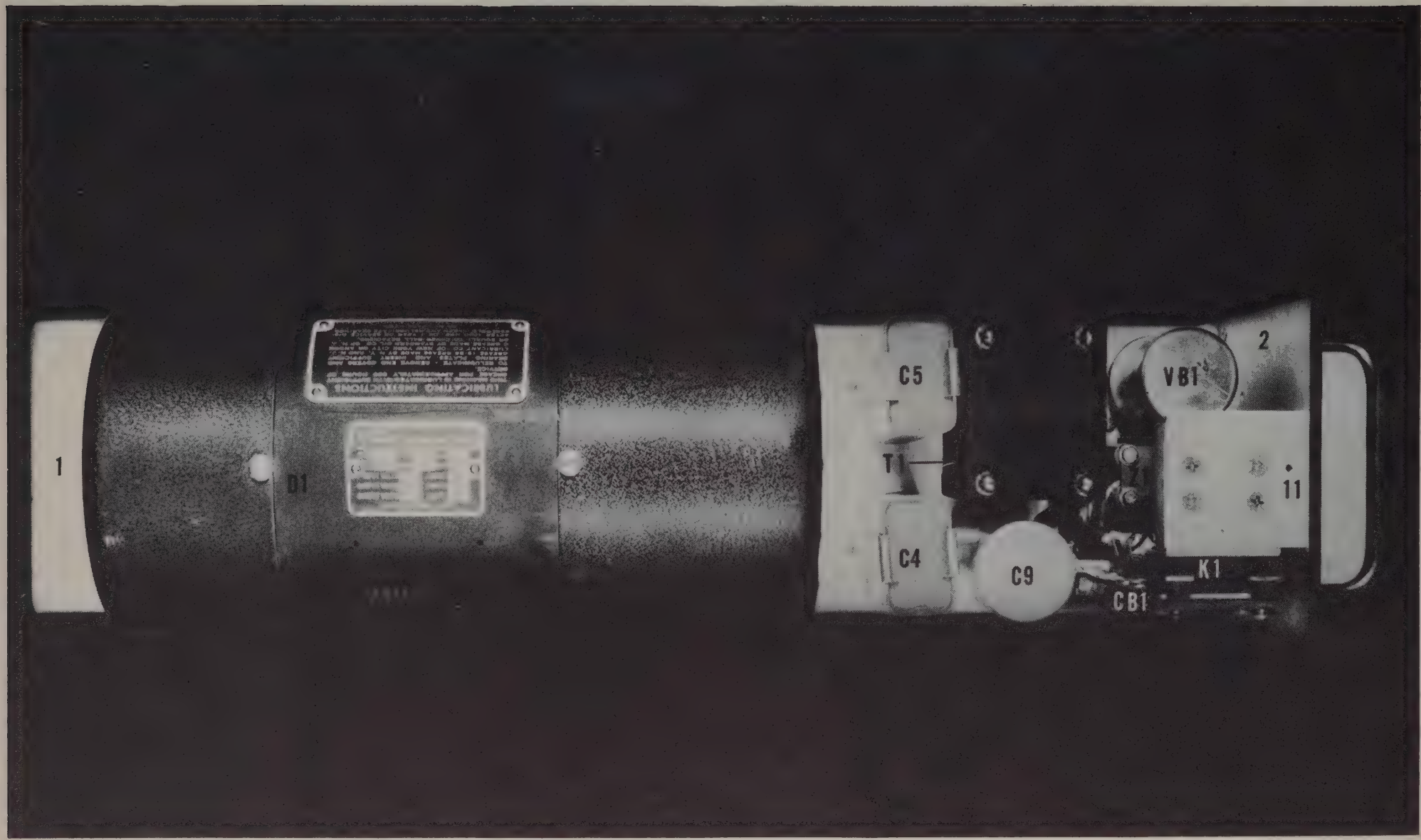
SYM	AEROCOM PT. NO.	FUNCTION	DESCRIPTION	VALUE	TOL.	REMARKS
C1	A-945	Vibrator Filter	Capacitor	0.68 mfd	+-10%	200 WV
C3	A-946	+28 V DC Filter	Capacitor	1.0 mfd	-15+25%	200 WV
C4	A-939	+400 VDC Filter	Capacitor	1.0 mfd	+-10%	1500 WV
C5	A-939	+750 VDC Filter	Capacitor	1.0 mfd	+-10%	1500 WV
C6	A-931	-750 VDC Filter	Capacitor	0.1 mfd	+-10%	1000 WV
C7	A-946	Vibrator Filter	Capacitor	1.0 mfd	-15+25%	200 WV
C8	A-947	Bias Supply Hash Filter	Capacitor	0.01 mfd	+-20%	600 WV
C9	A-908	Bias Supply Filter	Capacitor	4.0 mfd	+-10%	600 WV
CB1	A-2327A	Dynamotor Circuit Prot.	Breaker	1 A 400 V	1.0-1.2 A	1 Amp Instant trip
CR1	A-7304	Bias Supply	Rectifier Selenium	100 MA		4 required
D1	A-6005	400 & 750 V DC Source	Dynamotor			
F1	A-575	Bias Supply & Relay Prot	Fuse	1.6 Amp	Slow Act.	"Fusetron DE"
P1	AR-5865	DPU Disconnect	Connector			
K1	A-2016	Dynamotor Start	Relay			
K2	A-2017	Bias Supply Interlock	Relay			DPDT 680 ohm coil
L1	AR-5866	+28 V DC RF Filter	Choke	5.5 mh	+-15%	Dwg. DPU #11
L2	A-9160	+400 V DC RF Filter	Choke	0.5 mh	+-15%	750 MA
L3	A-9160	+750 V DC RF Filter	Choke	0.5 mh	+-15%	750 MA
L4	A-9160	-750 V DC RF Filter	Choke	0.5 mh	+-15%	750 MA
L5	AR-5867	Bias Supply Hash Filter	Choke	0.2 mh	+-15%	Dwg. DPU #15
R2	A-7044	H.V. Meter Series	Resistor	1.5 meg	1%	5 watt
R3	A-7045	H.V. Meter Shunt	Resistor	5000 ohms	10%	25 watt
R4	A-7046	Bias Supply Filter	Resistor	3500 ohms	2%	20 watt
T1	R-3054	Bias Supply Power	Transformer			
TB1	A-2940	Dynamotor Disconnect	Terminal Strip			
VB1	A-3018	Bias Supply Vibrator	Vibrator	28 VDC		
XF1	A-2118	Bias Supply & Relay Prot.	Fuse Holder			Extractor Post
XF2	A-2118	Spare Fuse	Fuse Holder			Extractor Post
XVB1	R-2536	Vibrator Socket	Socket			Octal
		NOTICE: Following additional items used only in units prior to Modification "B".				
CB1	A-2327	Dynamotor Circuit Prot.	Breaker	40 Amp		32 V DC Curve 1
F3	8-1365	High Voltage	Fuse	1 Amp	Quick Acting	3 AG
XF3	A-2118	High Voltage	Fuse Holder			Extractor Post
XF4	A-2118	High Voltage Spare	Fuse Holder			Extractor Post

-3 Add Modif. "B" 9-13-54 (Re-typed)
-2 Add Modif. "A" 5-18-53 HDS
-1 Corrected C3 & C7 12-24-52

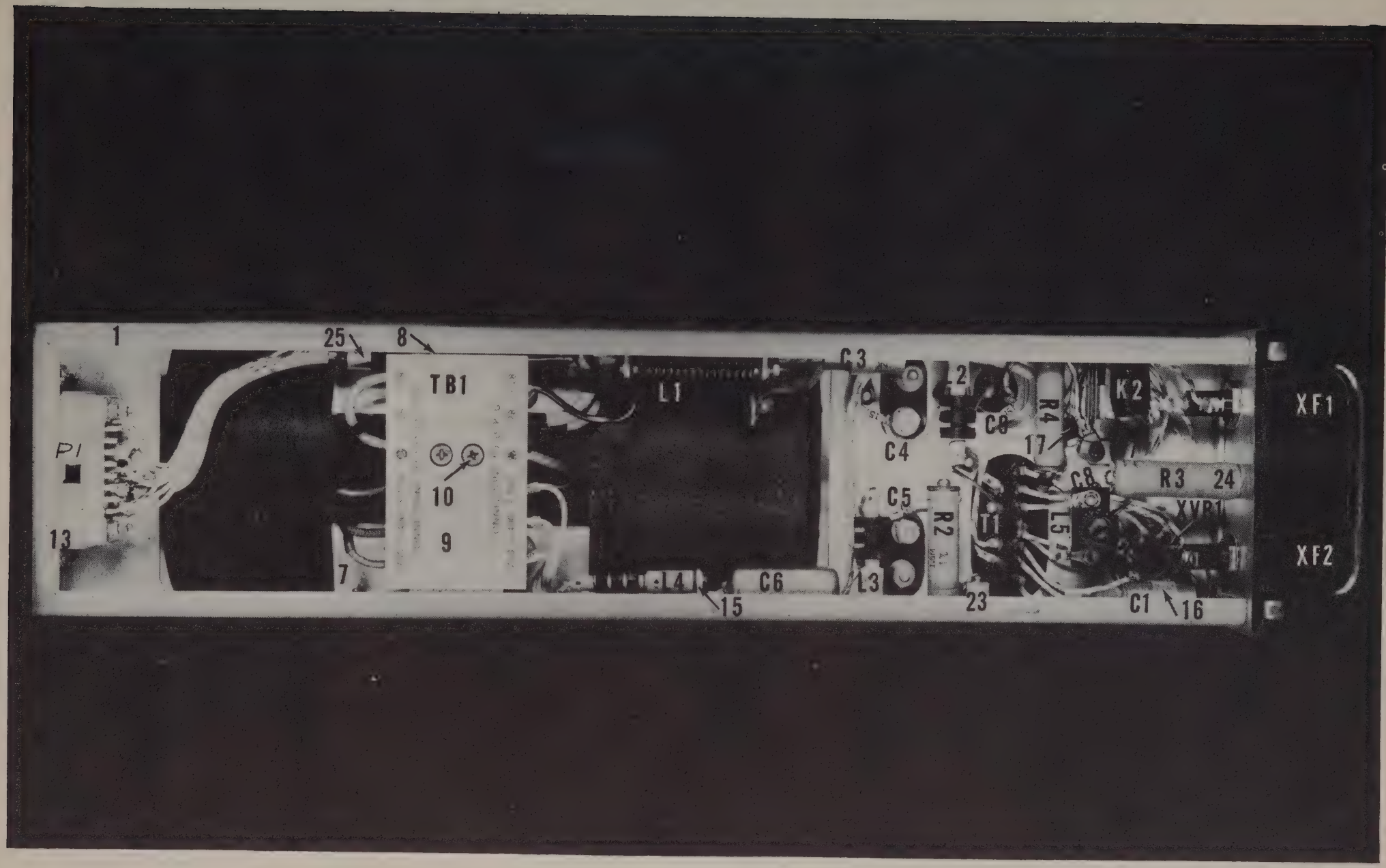
DESIGN	NAME	DATE	MODEL DPU POWER UNIT WITH MODIFICATION "B" PARTS LIST (ELECTRICAL)	DWG. NO. A-1038-3
DRAWN	WHE	10/10/52		SCALE
CHECKED	[signature]	9-13-54		
APPROVED			AERONAUTICAL COMMUNICATIONS EQUIPMENT INC. 3090 DOUGLAS ROAD, MIAMI, FLORIDA	



AEROCOM POWER UNIT DPU No. P-21-A



AEROCOM POWER UNIT DPU No. P-21-B



AEROCOM POWER UNIT DPU No. P-21-C

DIO CIRCUIT
EMATIC

DWG. NO.
AT-144 # 150-4

AL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

EXCITER STRIP

OSC. 5654 V_1 — RF AMP. 6146 V_2 — BUF 6146 V_3

PA 4-65A$_1$ V_4 — 4-65A$_2$ V_5

VARIO CLUTCH — L11 — L12

RCVR J12 — ANT TUNER J11

LOW PASS FILTER

J10 EXTER FREQ

S2-A — S2-B — S2E REAR — S2C FRONT — S2D — S2G OUTER — S2H TOP — S2I

K1

P5 / J5

811A, 811A$_2$ 4-65A, 4-65A$_2$

F2 27.5 V (F1 I.S.)

TO1 27.5 V (CONT.)

AUDIO STRIP

SP. AMP. 5654 V_6 — CLIPPER 5726 V_7 — BAND PASS FILTER L1 L2 — DRIVER 6005 V_8 — MOD. 811A$_2$ V_{10} — 811A$_1$ V_9

T1 — T2 — T3

S5 (Pos. 1, 2, 3, 4, 5) — K4

TO CONTROL CIRCUIT (NORMALLY SHORTED EXCEPT DURING TUNE UP PERIODS.)

J8 MIC. — P3 / J3 — J4 — J9 PHONES

SIDETONE DETECTOR

ENT. FREQ. ON/OFF

HV METER CIRCUIT — +400 — +400 (TO AAT) — -750 (+400 V.) — BIAS (-125) — P.T — MIC. AUDIO — NC — TO1 (CONT.) 27.5 V — 27.5 V (F1 I.S.) F2 — +750 (+1150 V.) — RCVR AUDIO — RCVR SIDETONE AUDIO OUTPUT

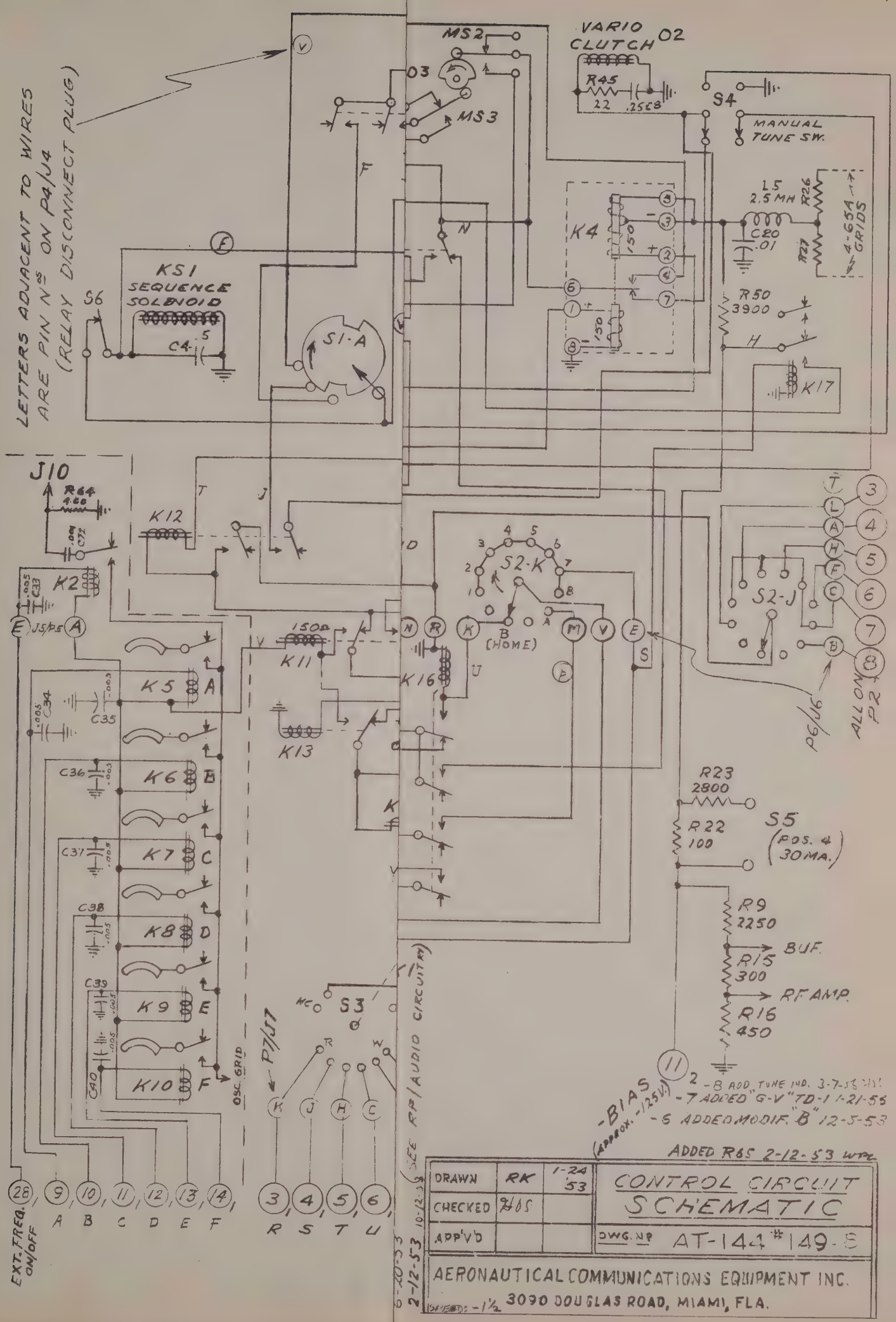
DESIGN	NAME	DATE
DRAWN	RK	1-14-53
CHECKED		
APPROVED		

2-12-53

RF/AUDIO CIRCUIT SCHEMATIC

DWG. NO. AT-144*150-4

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA


LETTERS ADJACENT TO WIRES ARE PIN Nos ON P4/J4 (RELAY DISCONNECT PLUG)
MS2
MS3
VARIO CLUTCH
R45
22
.25CB
S4
MANUAL TUNE SW.
L5
2.5 MH
R26
C20
.01
R27
4-6SA GRIDS
K4
150
R50
3900
K17
KS1
SEQUENCE SOLENOID
S6
C4
S1-A
J10
R64
4.6Ω
C72
K12
S2-K
S2-J
K2
C33
J5/P5
150Ω
K11
K16
K13
K5
K6
K7
K8
K9
K10
C34
C35
C36
C37
C38
C39
C40
OSC. GRID
P7/J7
S3
(SEE RF/AUDIO CIRCUITRY)
R23
2800
R22
100
S5
(FDS. 4 30 MA.)
R9
2250
BUF.
R15
300
RF AMP.
R16
450
-BIAS
(APPROX. -125V.)
P6/J6
ALL ON P2
EXT. FREQ. ON/OFF
A B C D E F
R S T U
2 - B ADD. TUNE IND. 3-7-53 JD!
1 - T ADDED "G-V" "TD-1" 1-21-53
- 5 ADDED MODIF. "B" 12-5-53
ADDED R65 2-12-53 WTP.
DRAWN RK 1-24-53
CHECKED
APP'V'D
CONTROL CIRCUIT SCHEMATIC
DWG. NO AT-144 #149-B
AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLA.

LETTERS ADJACENT TO WIRES ARE PIN Nos ON P4/J4 (RELAY DISCONNECT PLUG)

K14 K23 K20 K22 K19 K4 K17 K12 K2 K5 K11 K13 K18 K6 K7 K8 K9 K10 K24 K15 K16 K3 K21 K1

KS1 SEQUENCE SOLENOID — S6 — C4 .5

S1-A S1-C S1-E S1-F S1-B S1-D

FINAL TUNE — SETUP — OFF

R30 120 — R31 330 — R33 820

B1 MTR — C31 .005 — R63 15

R48 2500 — R65 2500 — R19 1000

J10 — R64 400 — C37 .005

C33 .005 — C34 .005 — C35 .005 — C36 .005 — C37 .005 — C38 .005 — C39 .005 — C40 .005

1500

G-V RM-60-SP 26.5 V.DC

AMPERITE 26NO60T

EUREKA 26.5-60-C

TD-1 BASE DIAGRAMS

TD-1 SOCKET — K24 — C96 .01 — C97 .01 — F1 5 — F2 10

465A2 465A1 811-A2 811-A1

C22 .01 — C21 .01 — C24 .01 — C23 .01 — R2 .72Ω — R4 24Ω — R5 — R6

6146, 6146, 5654 — B2 BLO — C16 .01 — C18 — C38 .005 — C32 .005 — R1 122Ω

20Ω R3 → PIN 6 ON J3

DRUM CLUTCH 01 — C7 .25 — R44 22

S3 — P7/J7 — OSC. GRID

K — J — H — C — B — A — D — F — E NC

PIN 5 ON J3

J8

J9

SIDETONE R20 — KEYING RELAY (SEE RF/AUDIO CIRCUITRY)

MS1 — MS2 — MS3

VARIO CLUTCH 02 — R45 22 .25 CB

S4 MANUAL TUNE SW.

L5 2.5 MH — C80 .01 — R26 — R27 — 4-65A GRIDS

R50 3900

KS2 BAND SOLENOID — S7 — C5 .5

S2-K — B (HOME)

S2-J

R23 2800 — R22 100 — S5 (POS. 4 30 MA.)

R9 2250 — BUF. — R15 300 — RF AMP. — R16 450

-BIAS (APPROX. -125V)

2 - B ADD TUNE IND. 3-7-53 WTC
7 ADDED "G-V" "TD-1" 12-5-52
6 ADDED MODIF. "B" 12-5-52

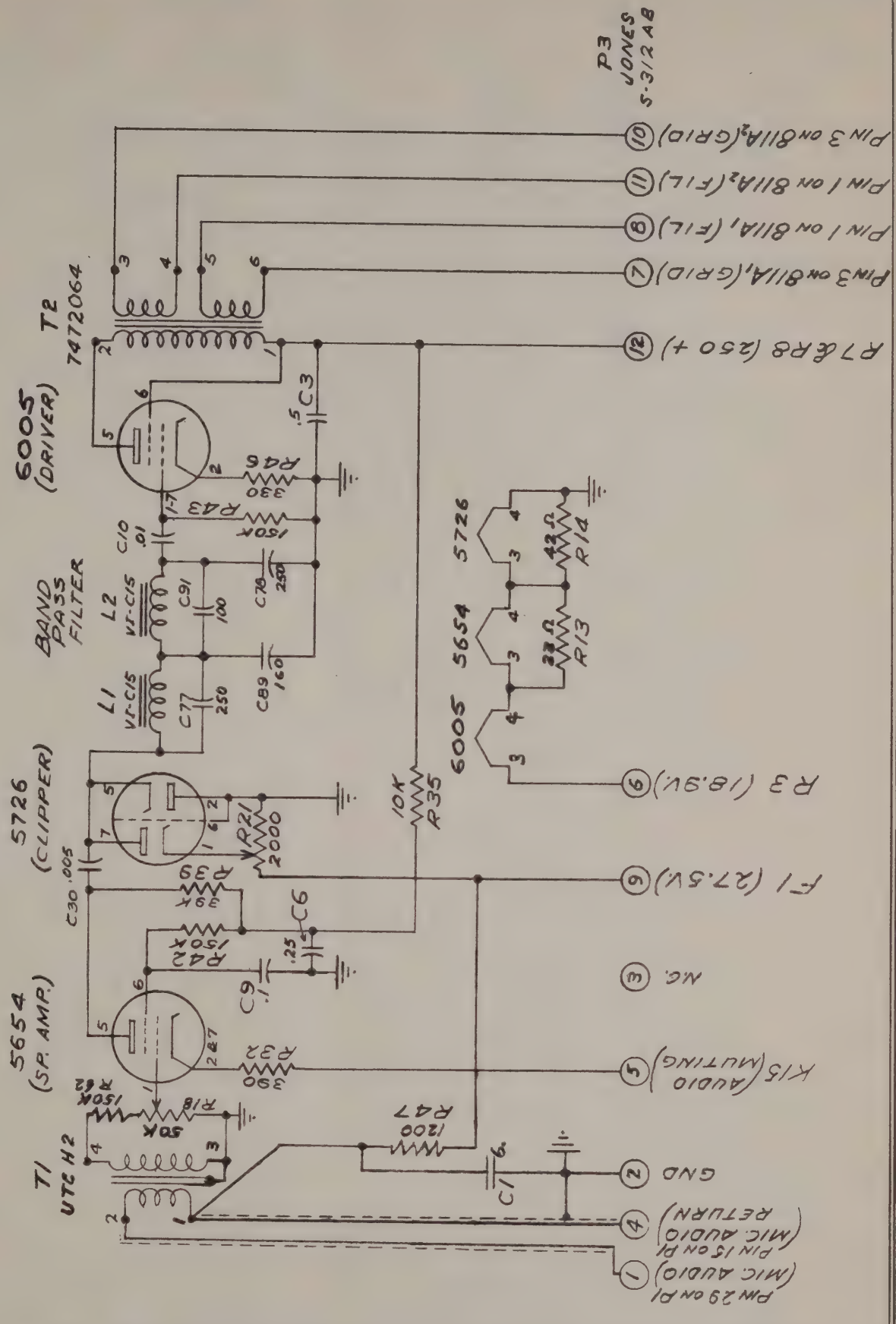
ADDED R65 2-12-53 WTC

9-9-53 — 5-20-53 — 2-12-53 — 10-12-53

DRAWN	RK	1-24-53	CONTROL CIRCUIT SCHEMATIC
CHECKED	[illegible]		
APP'V'D			DWG. NO AT-14-149

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLA.

EXT. FREQ. ON/OFF — A B C D E F — R S T U V W X — 27.5 CTLS — 27.5 FILAMENT — TRANS. HOLD — T.D. PROTECT — P-T — CW DYN STK — TUNE IND. RETUNE INFO. — DYN. START — VIB. START — CW KEY — TIME DELAY CUTOFF — RCVR/SIDETONE AUDIO OUTPUT — RCVR AUDIO



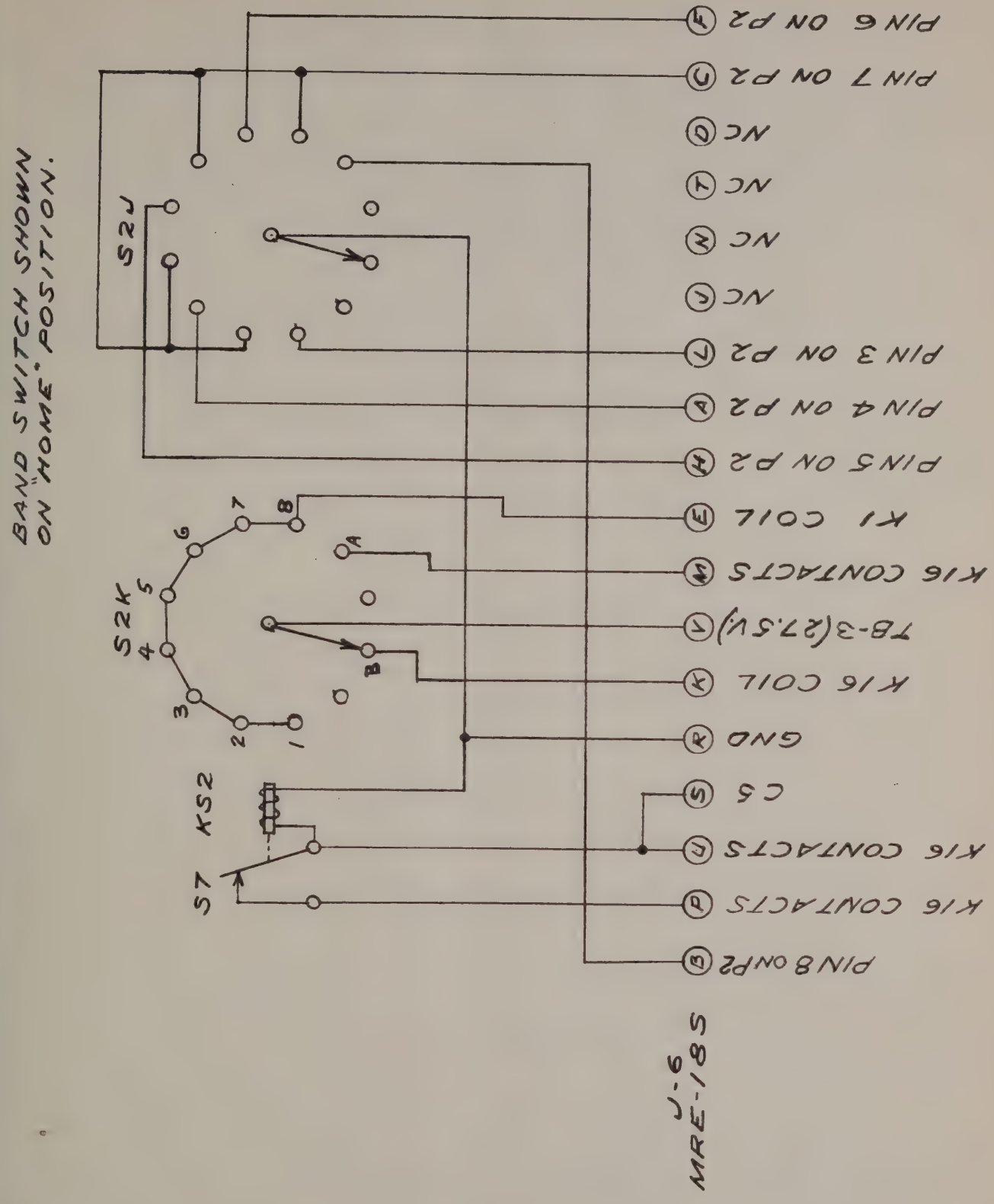
DESIGN	NAME	DATE
DRAWN	RK	6-27 52
CHECKED	WHE	12-2 52
APPROVED		

AUDIO ASSEMBLY CIRCUITRY

DWG. NO. AT-144 #41

SCALE

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA



J-6
MRE-185

-2 ADDED WIRE AT B - 2-25-53-GB
-1 CHANGED "B" POSITION 1-14-53 WMC

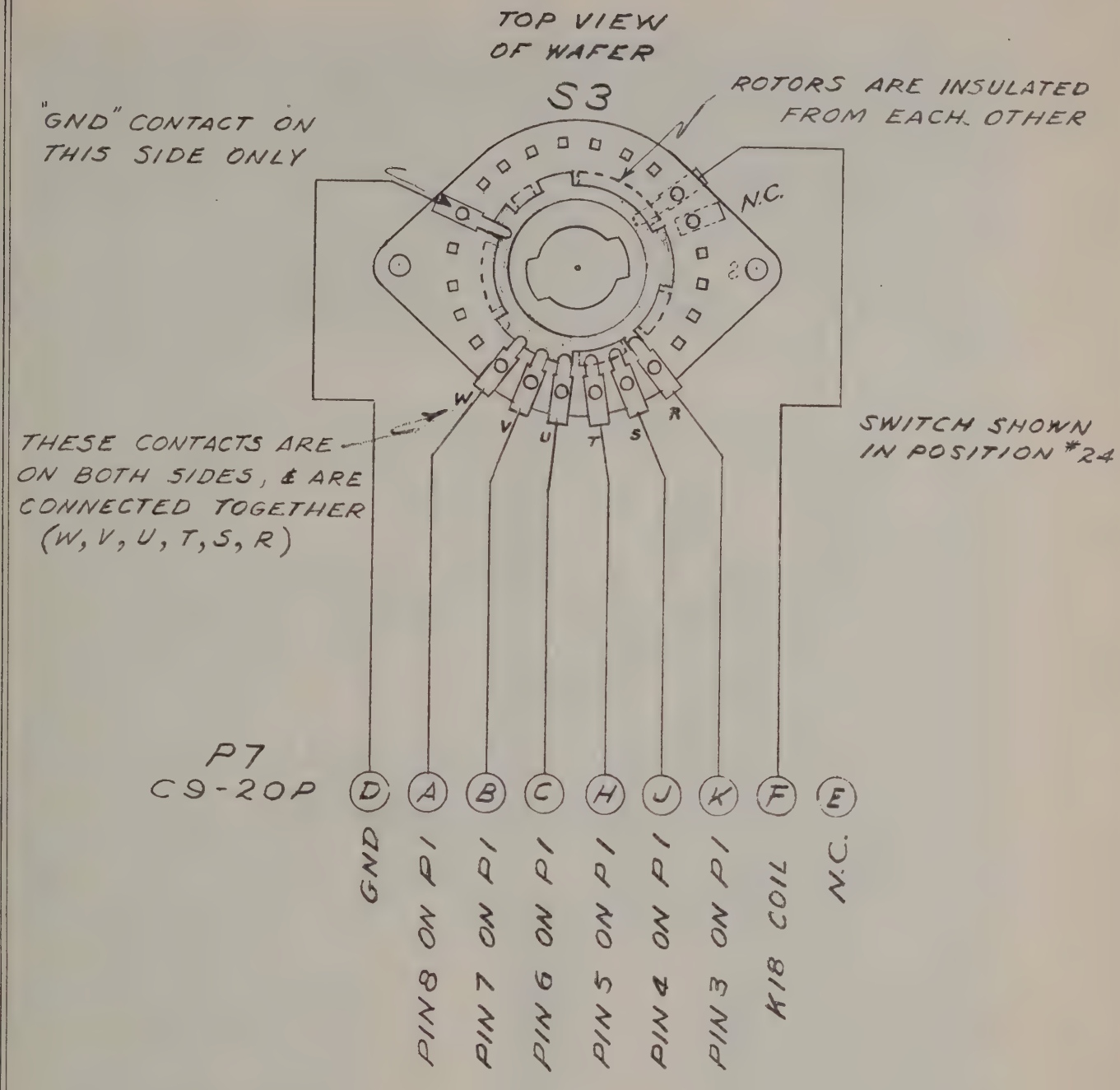
DESIGN	NAME	DATE
DRAWN	RK	8-2-'52
CHECKED	WMC	12-2-52
APPROVED		

BAND SOLENOID ASSEMBLY Z4 CIRCUITRY

Dwg. No. AT-144*61-2

SCALE

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA



-1 NOTES ADDED & CORRECTIONS
4-15-53 - CB

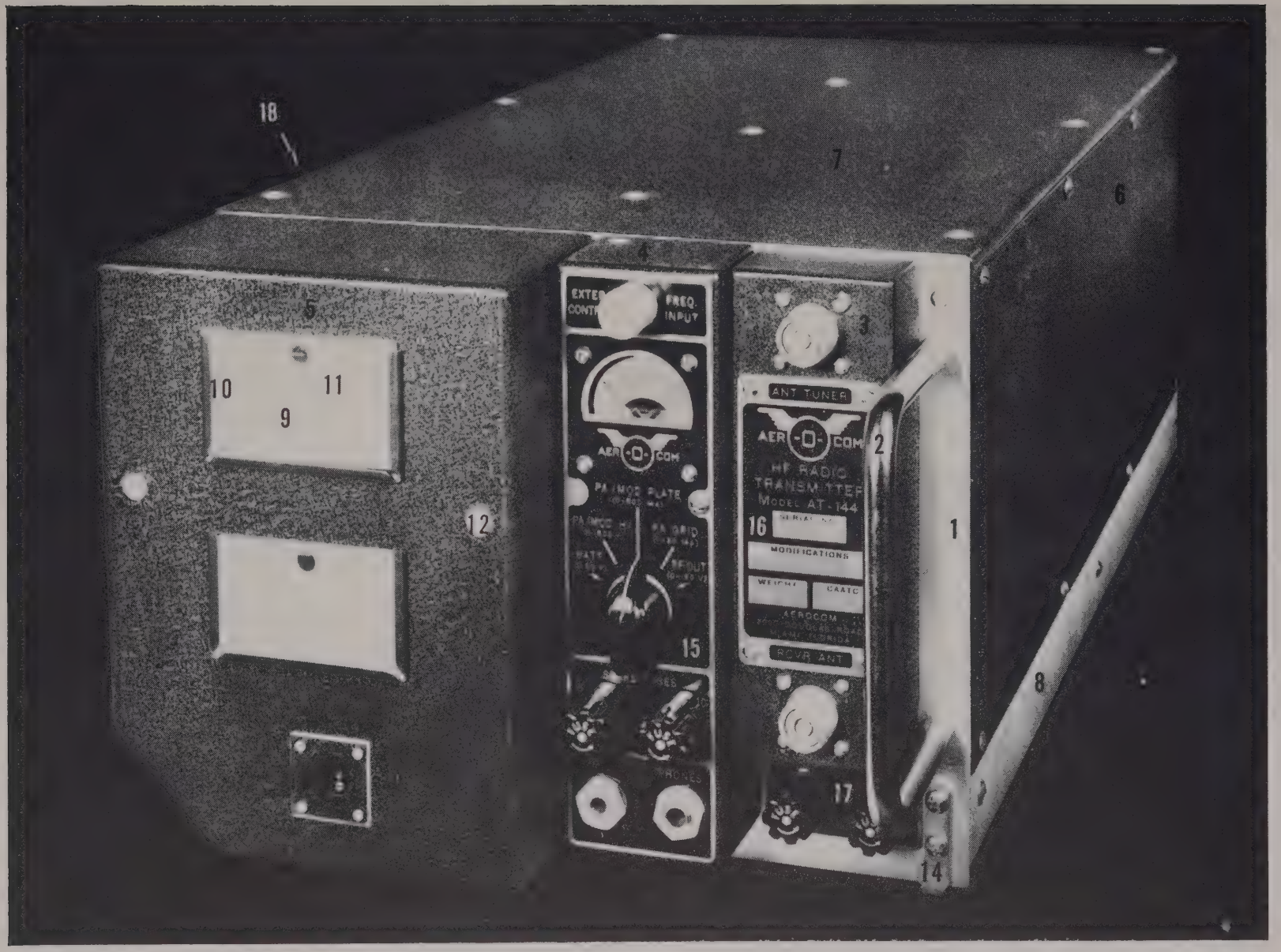
DESIGN	NAME	DATE
DRAWN	RK	8-7-'52
CHECKED	WKE	12-2-'52
APPROVED		

DRUM CONTROL ASSEMBLY CIRCUITRY Z5

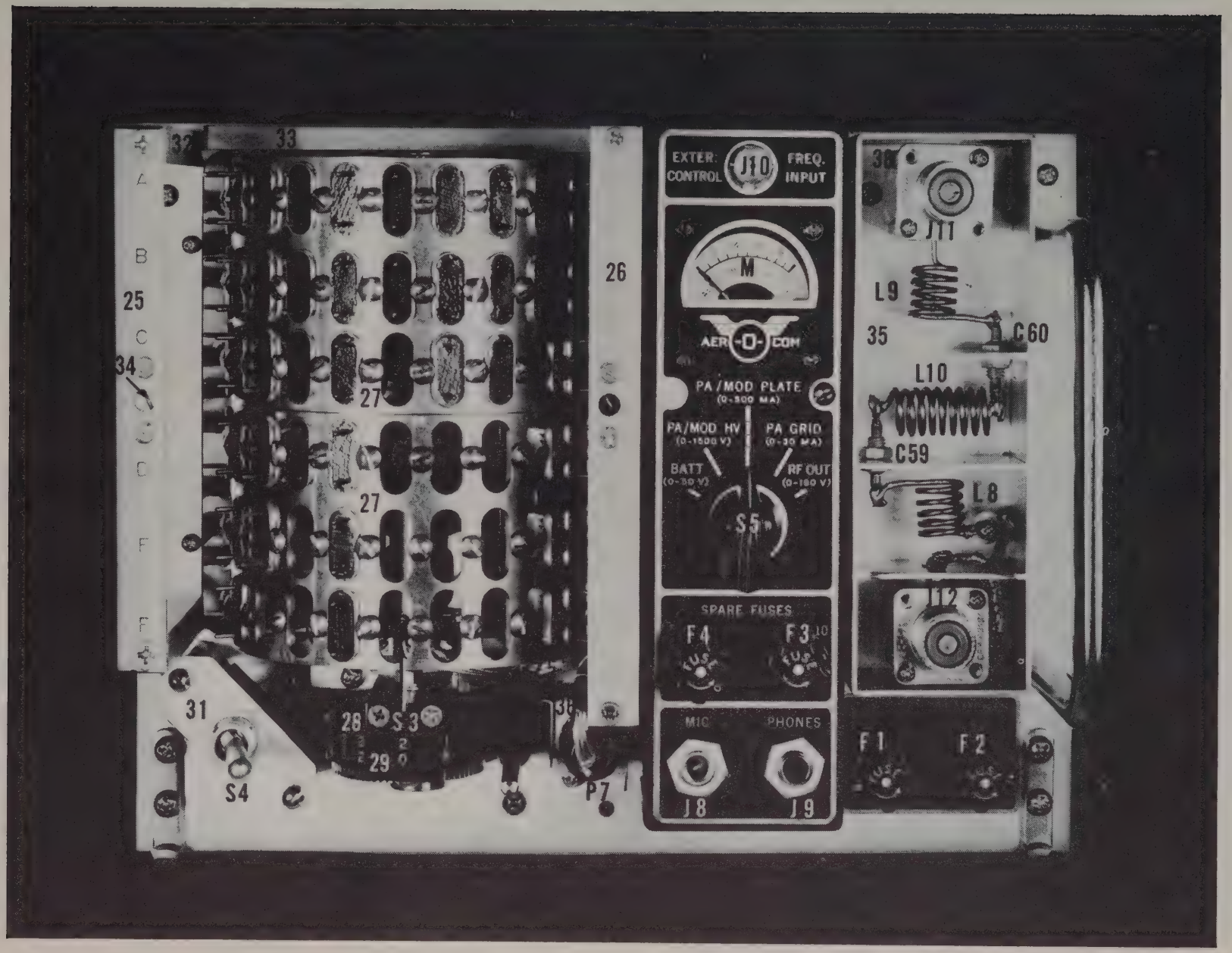
DWG. NO. AT-144 #64-1

SCALE

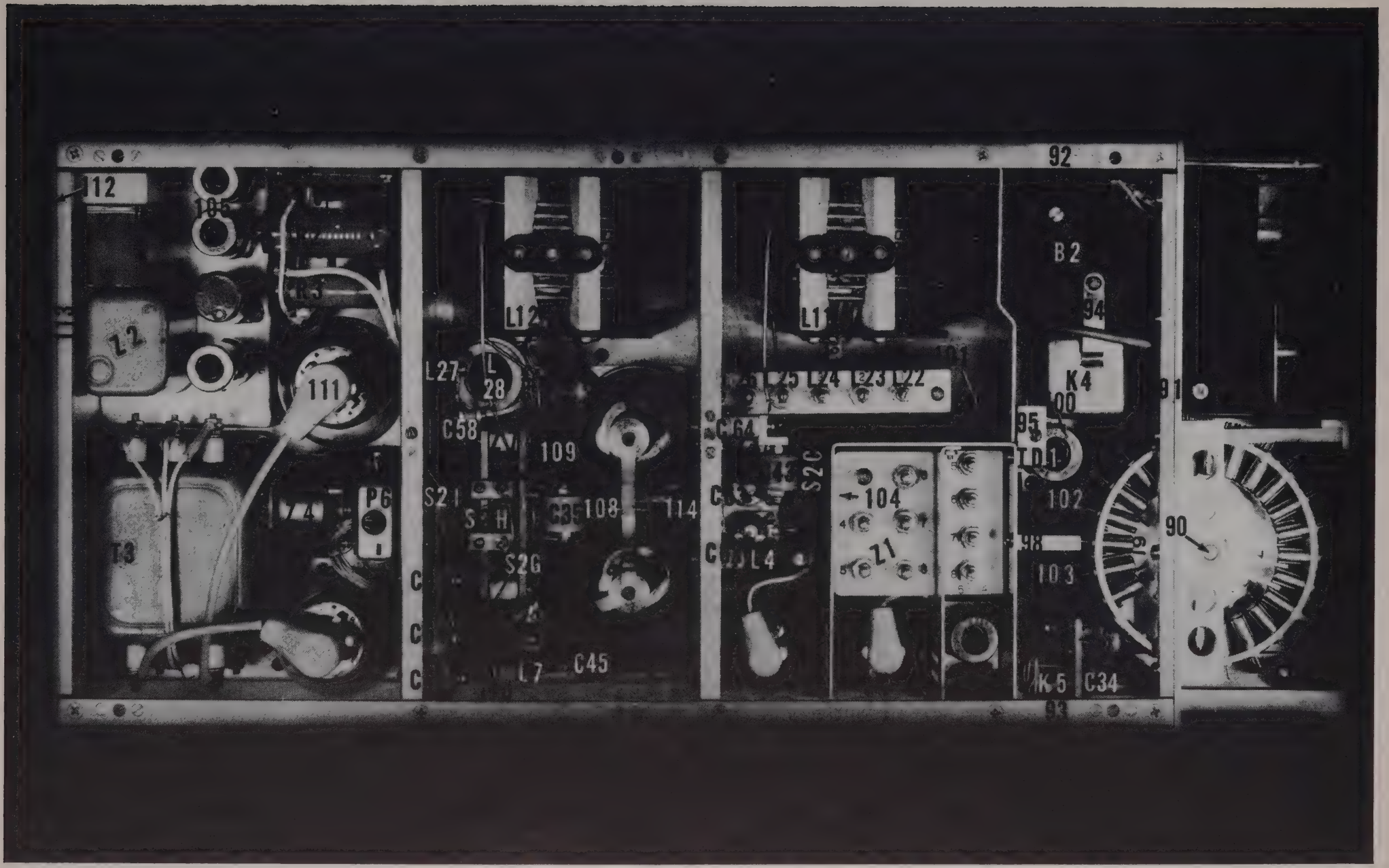
AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA



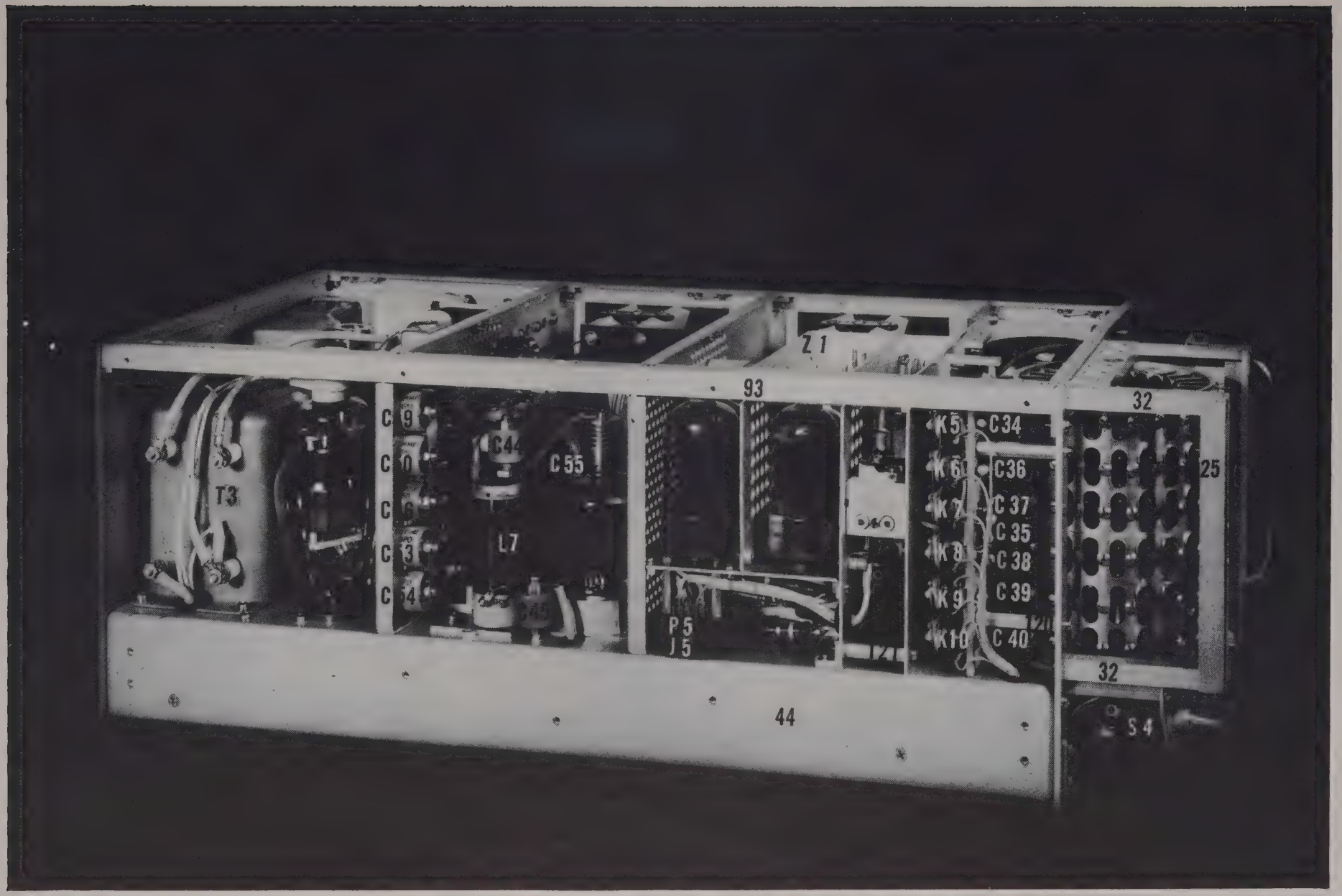
AEROCOM AT-144 No. P-119 RIGHT FRONT—ALL COVERS ON



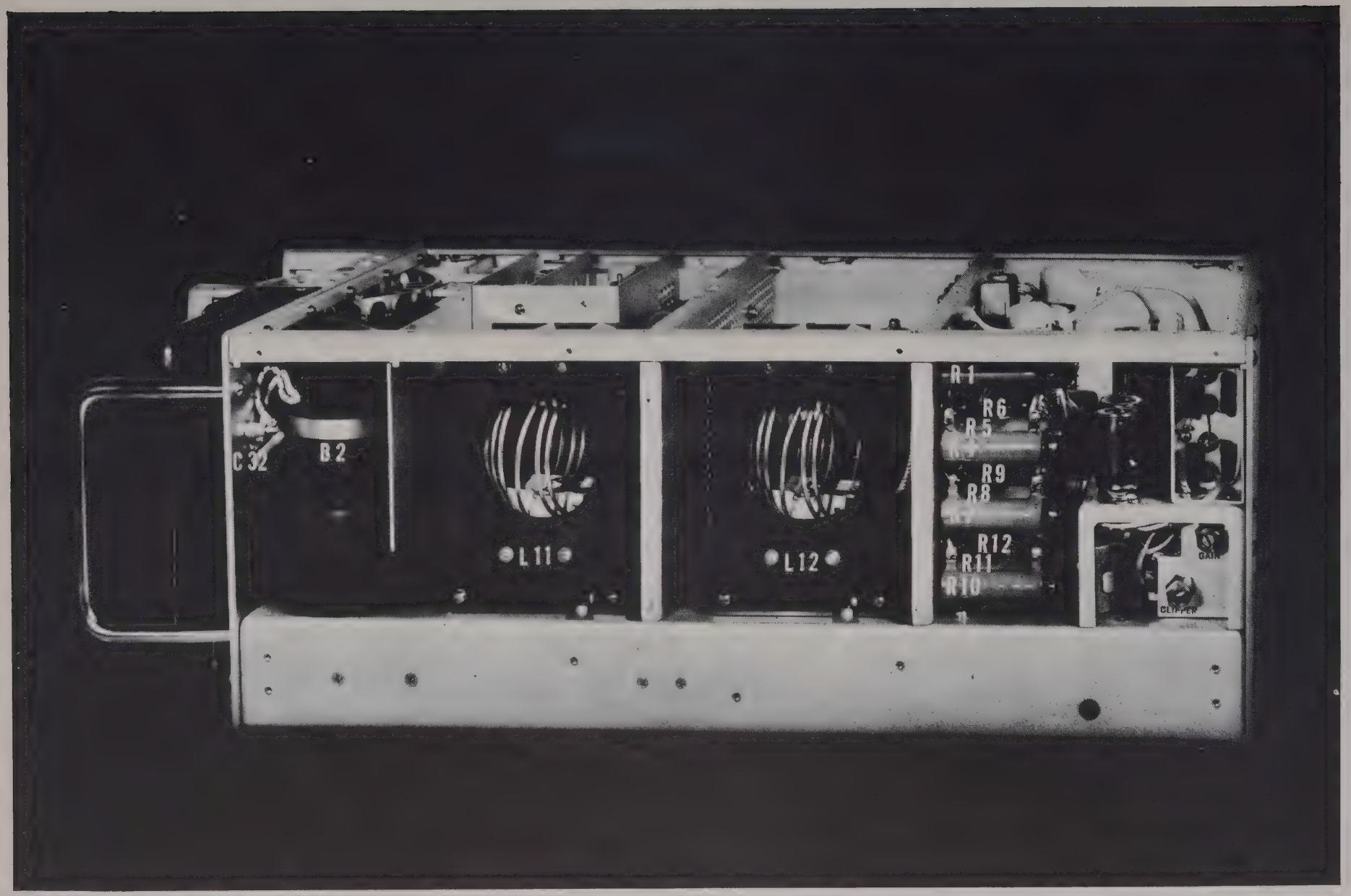
AEROCOM AT-144 No. P-120 FRONT—DRUM & FILTER COVERS OFF



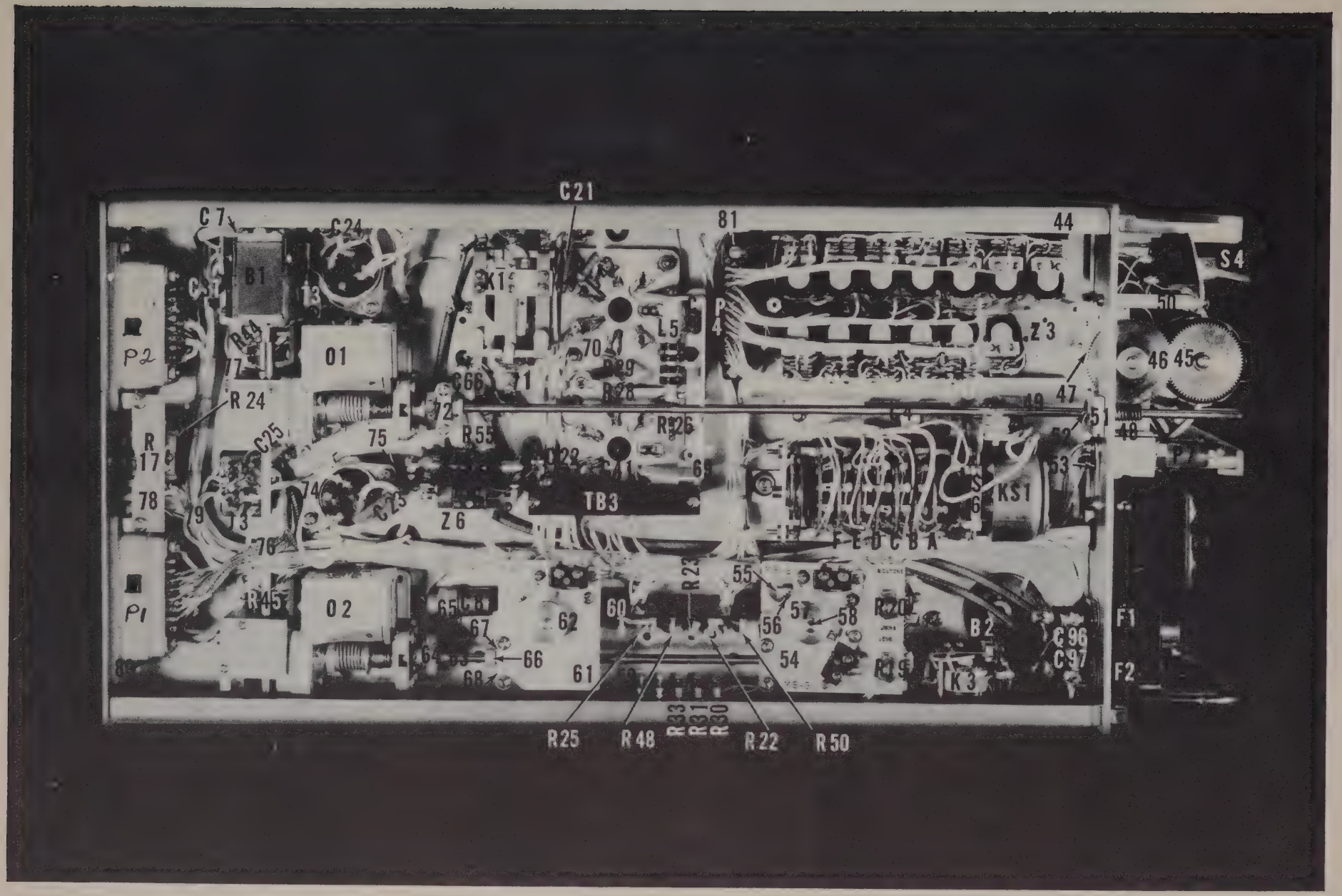
AEROCOM AT-144 No. P-121 TOP—COVERS OFF



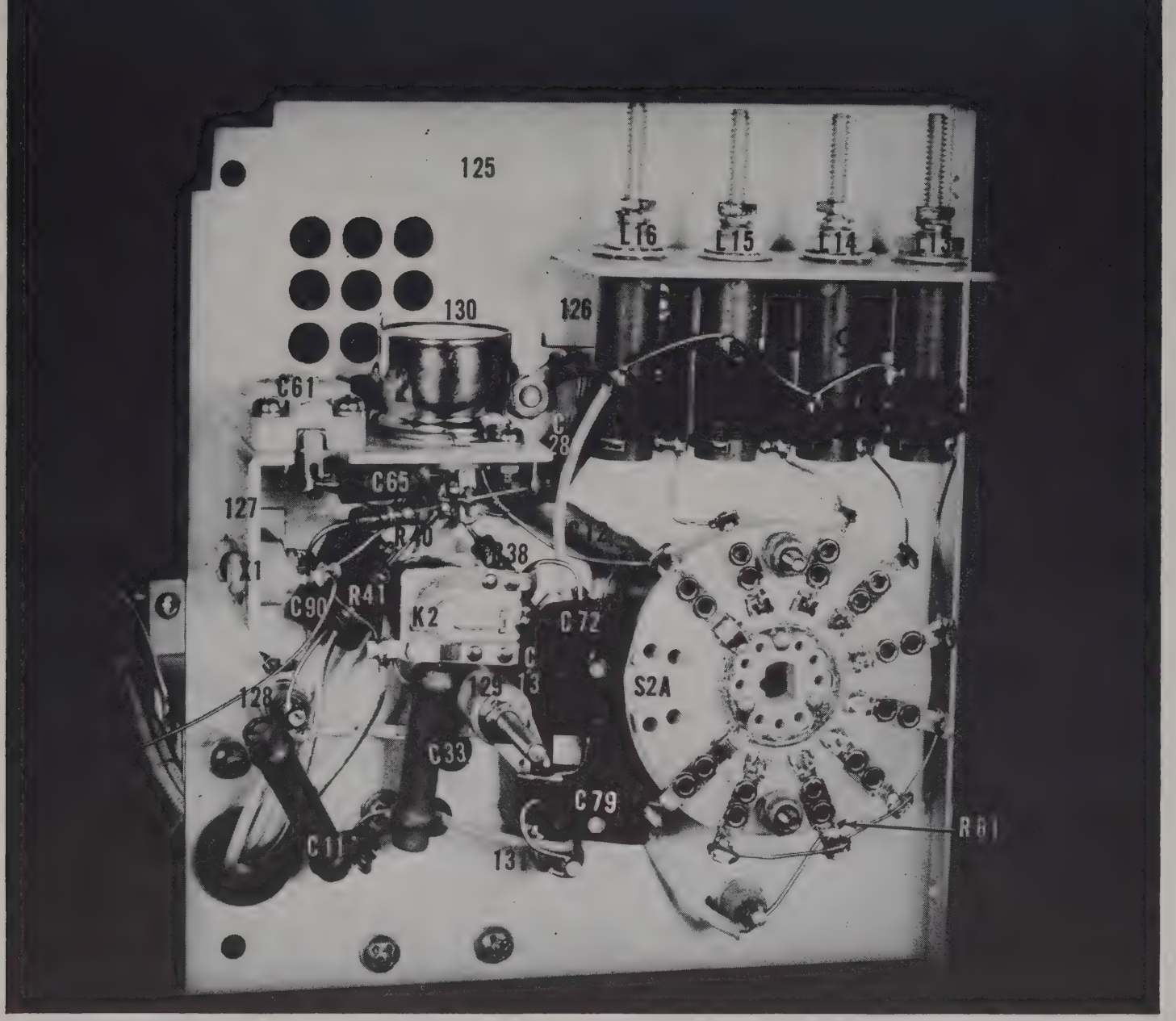
AEROCOM AT-144 No. P-122 LEFT SIDE—COVERS OFF



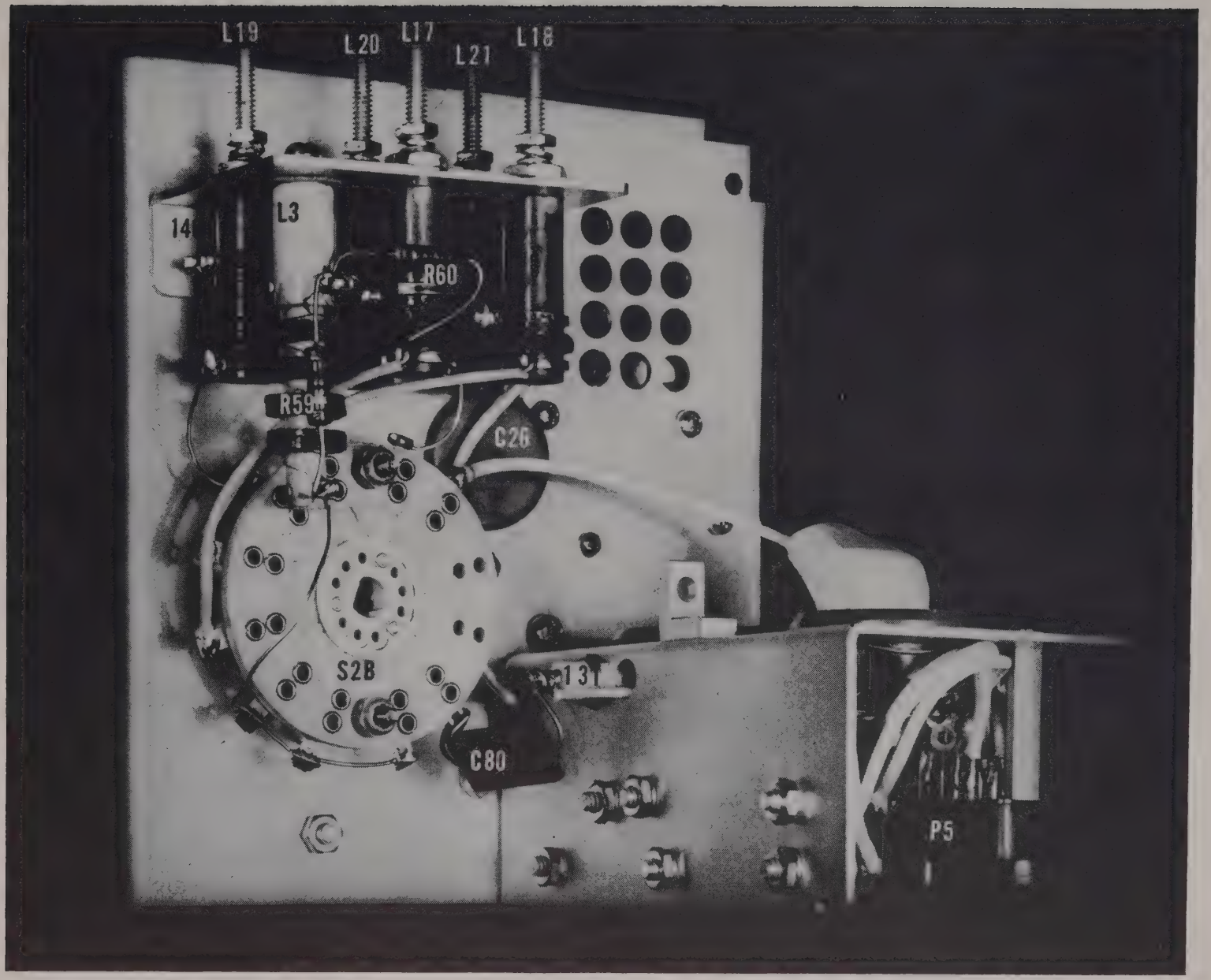
AEROCOM AT-144 No. P-123 RIGHT SIDE—COVERS OFF



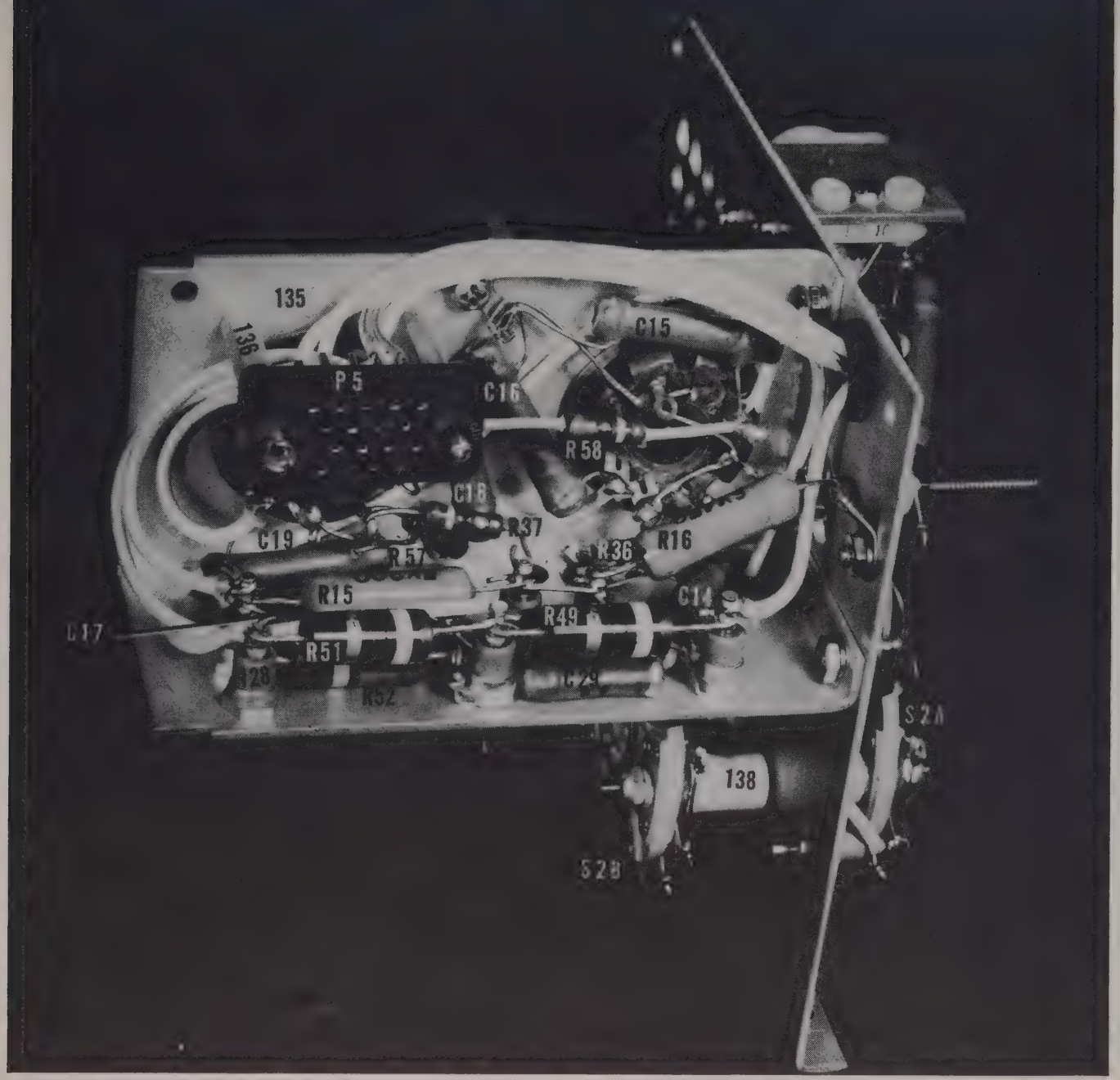
AEROCOM AT-144 No. P-124 BOTTOM—COVERS OFF



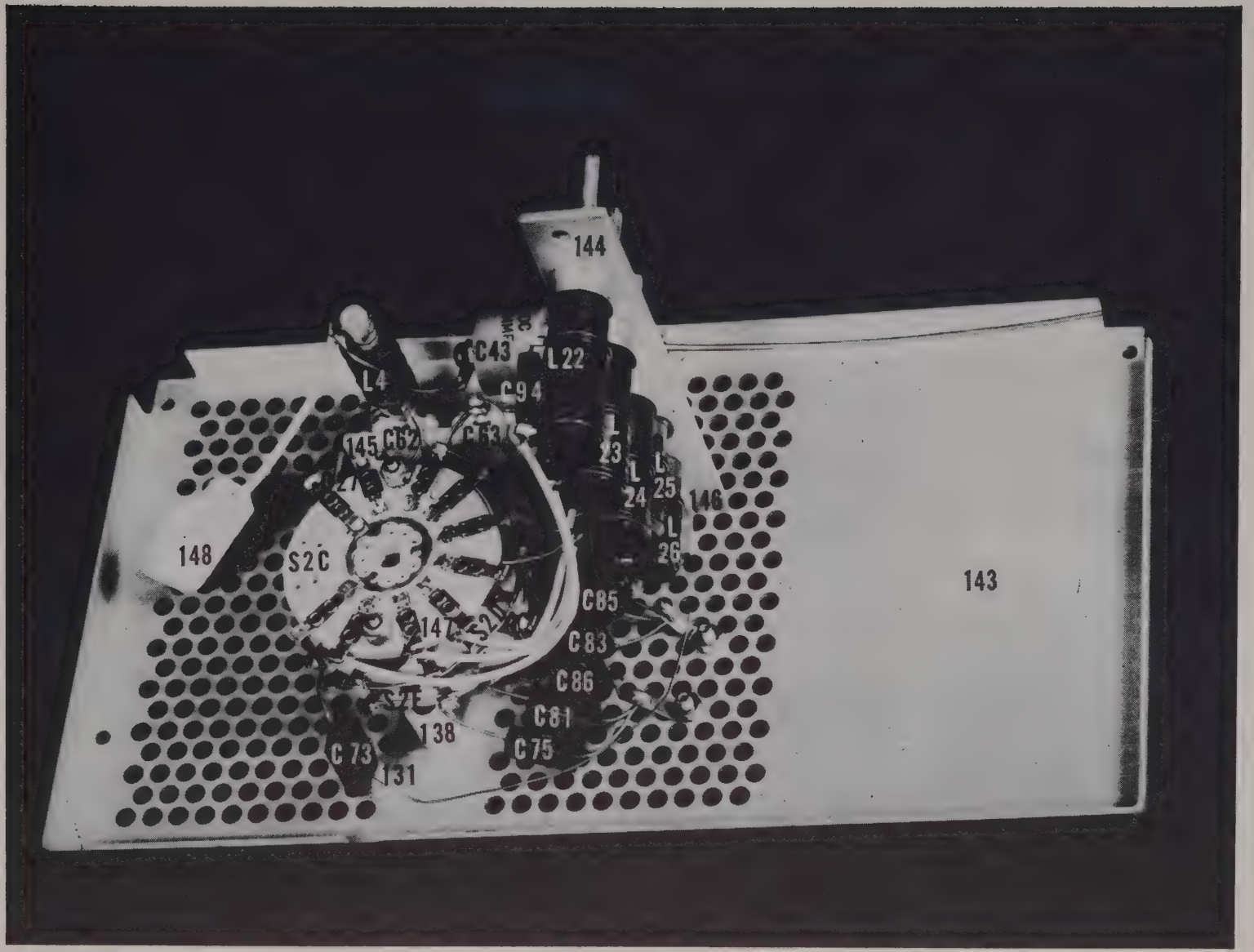
AEROCOM AT-144 No. P-125 RF EXCITER—OSCILLATOR SECTION Z1



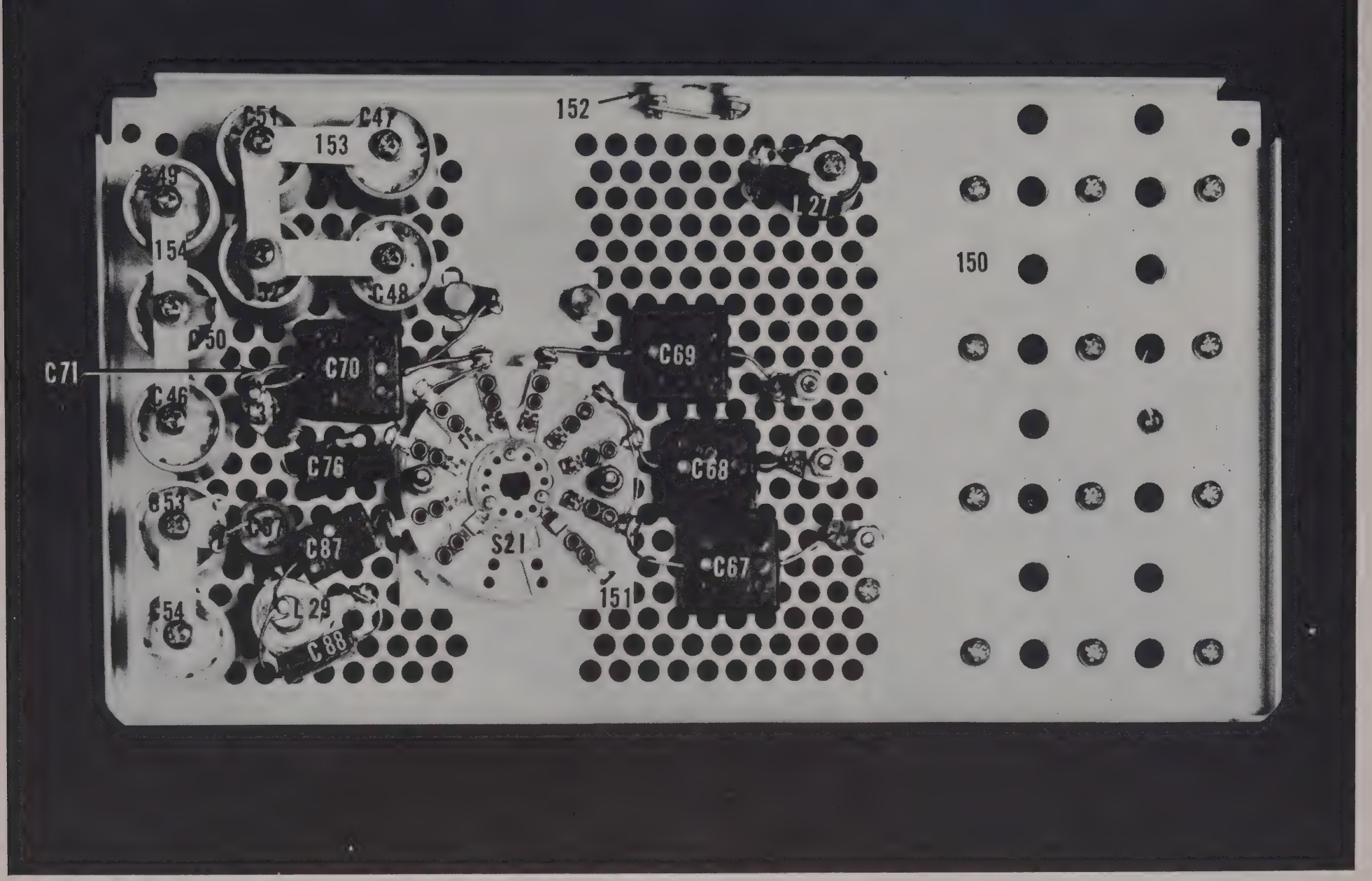
AEROCOM AT-144 No. P-126 RF EXCITER—RF AMPLIFIER PLATE SECTION Z1



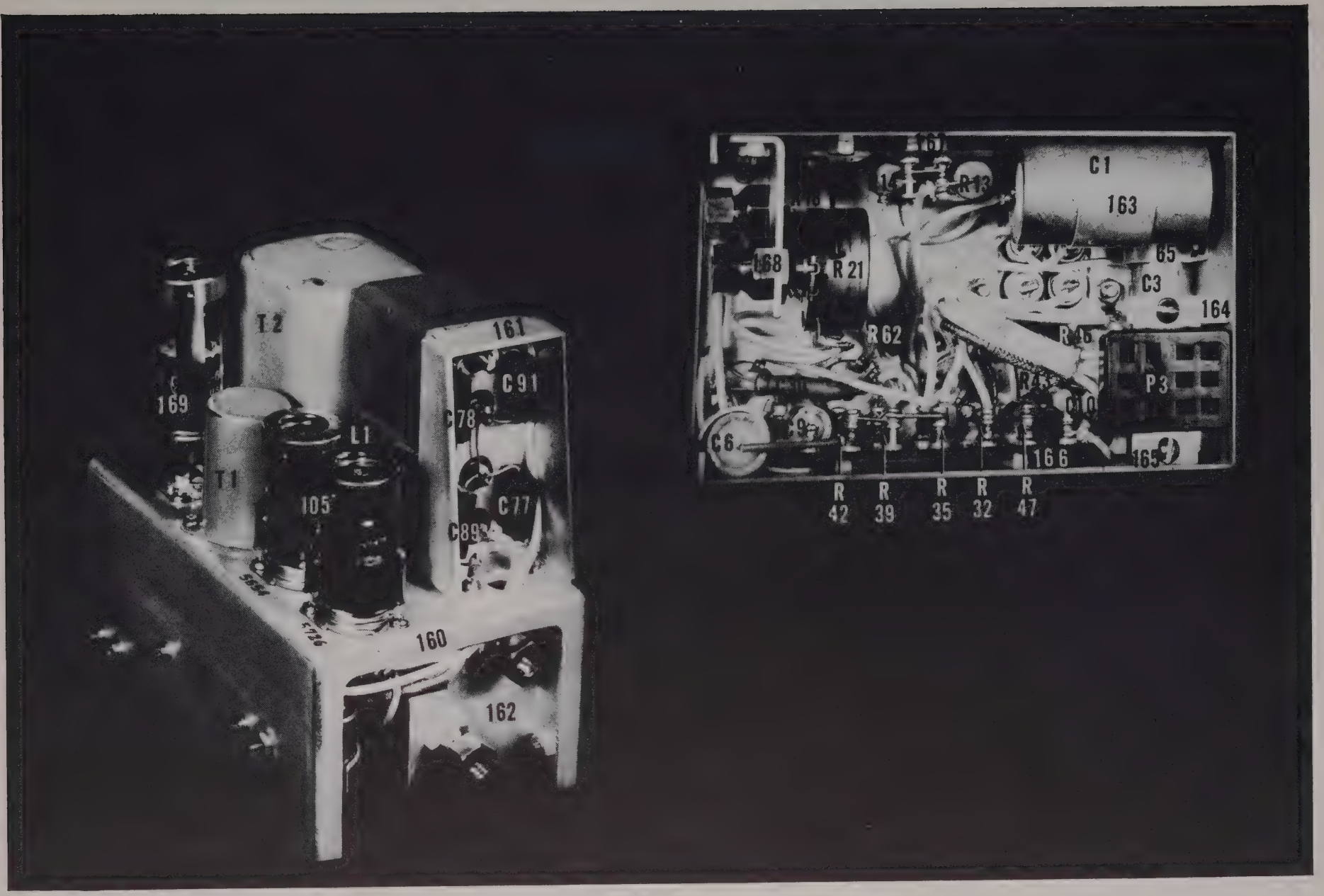
AEROCOM AT-144 No. P-127 RF EXCITER—BOTTOM VIEW OF TUBE SHELF Z1



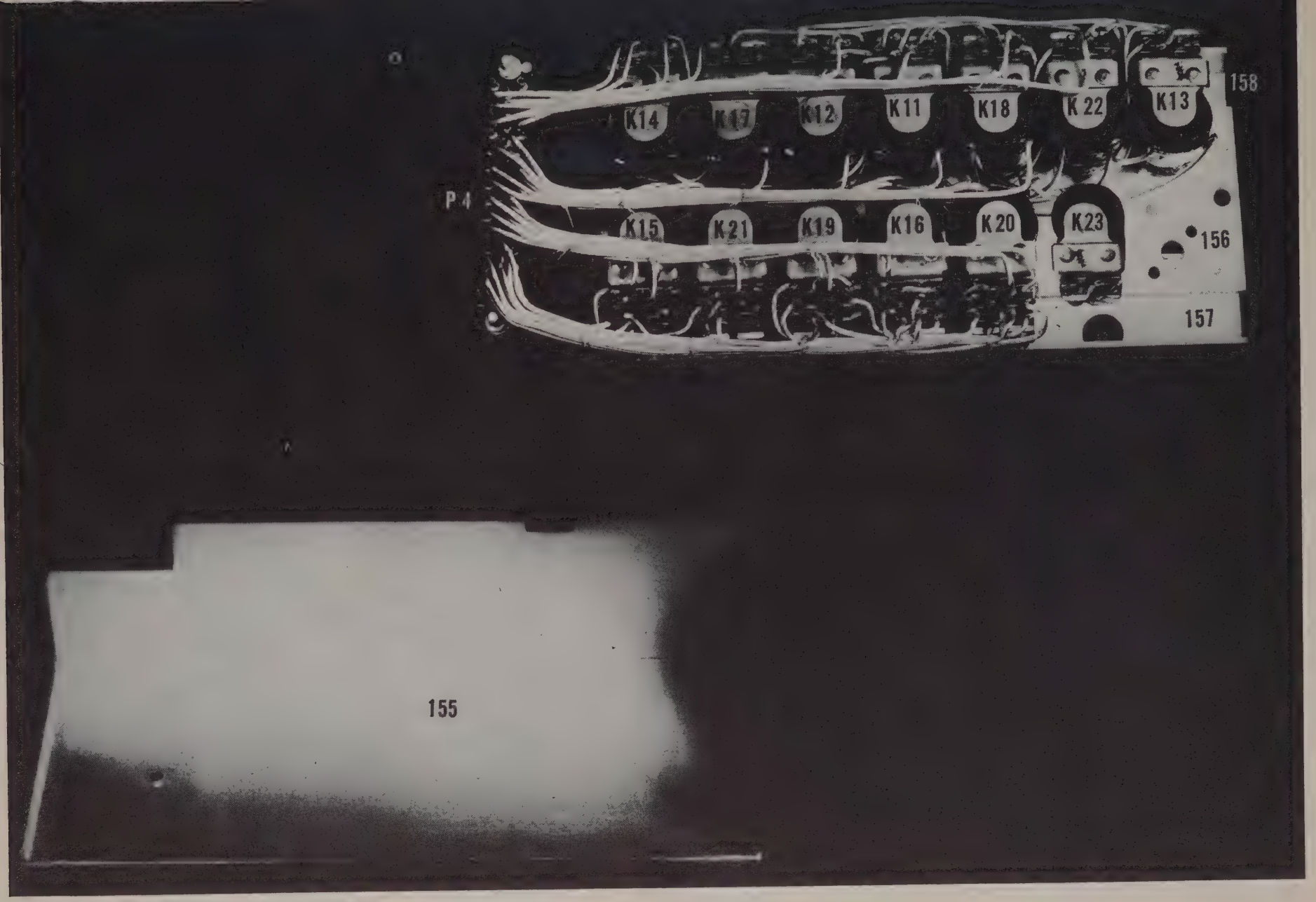
AEROCOM AT-144 No. P-128 BUFFER PLATE & COIL ASSEMBLY



AEROCOM AT-144 No. P-129 PA TUNING & LOAD CAPACITOR ASSEMBLY



AEROCOM AT-144 No. P-130 AUDIO ASSEMBLY Z2



AEROCOM AT-144 No. P-131 CONTROL RELAY ASSEMBLY Z3

SYMBOL	AEROCOM PT. NO.	FUNCTION	NAME OF PART	DESCRIPTION VALUE	TOL	MFG *	TYPE *	REMARKS
B1	AR-5877	Drum/Vario. Drive	Motor	27.5 VDC PM		EEP	PM112-375	Modified per AT-144 #142
B2	A-6006	Ventilation	Blower	27.5 VDC		SC	Ser.D-4653	
C1	A-950	Mic.Volt.Filter	Capacitor	6 mfd	-15% +25%	AS	MQCF 1.5-6M	150 W.V.
C2	A-946	Sidetone Audio Cplg	Capacitor	1 mfd	"	AS	MQCF 2-1 M	200 W.V.
C3	A-951	Audio Bypass	Capacitor	.5 mfd	"	AS	MQC 6-5	600 W.V.
C4	A-951	Seq. Solenoid Filter	Capacitor	.5 mfd	"	AS	MQC 6-5	600 W.V.
C5	A-1048	Band Solenoid Filter	Capacitor	1.0 mfd	"	AS	TQ-3-1M	300 W.V.
C6	A-952	Audio Bypass	Capacitor	.25 mfd	"	AS	MQC 6-25	600 W.V.
C7	A-952	Drum Clutch Coil Filter	Capacitor	.25 mfd	"	AS	MQC 6-25	600 W.V.
C8	A-952	Vario Clutch Coil Filter	Capacitor	.25 mfd	"	AS	MQC 6-25	600 W.V.
C9	A-953	Audio Bypass	Capacitor	.1 mfd	"	AS	MQC 6-1	600 W.V.
C10	A-947	Audio Coupling	Capacitor	.01 mfd	GMV**	CL	D6-103	600 W.V.
C11	A-947	Oscillator Cathode Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C12	"	Oscillator Screen Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C13	"	Oscillator Plate Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C14	"	RF Amp. Grid Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C15	"	RF Amp Screen Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C16	"	RF Amp. Fil. Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C17	"	Buffer Grid Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C18	"	Buffer Screen Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C19	"	Buffer Fil. Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C20	"	P.A. Bias Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.
C21	"	P.A. Fila. Bypass	Capacitor	.01 mfd	GMV	CL	D6-103	600 W.V.

* Or Equivalent
** Guaranteed minimum value

SYMBOL	AEROCOM PT. NO.	FUNCTION	NAME OF PART	DESCRIPTION VALUE	TOL	MFG*	TYPE*	REMARKS
C22	A-947	P.A. Filament Bypass	Capacitor	.01 mfd	GMV	CL	D6-103*	600 W.V.
C23	"	Mod. Filament Bypass	Capacitor	.01 mfd	GMV	CL	D6-103*	600 W.V.
C24	"	Mod. Filament Bypass	Capacitor	.01 mfd	GMV	CL	D6-103*	600 W.V.
C25	A-947	Audio Muting Bypass	Capacitor	.01 mfd	GMV	CL	D6-103*	600 W.V.
C26	A-954	R.F. Amp. Plate Bypass	Capacitor	.01 mfd	GMV	CL	DD16-103*	1600 W.V.
C27	A-954	Buffer Plate Bypass	Capacitor	.01 mfd	GMV	CL	DD16-103*	1600 W.V.
C28	A-949	Osc. Fila. Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C29	"	R.F. Exciter HV Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C30	"	Audio Coupling	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C31	"	Motor R.F. Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C32	"	Blower R.F. Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C33	"	Ext. Freq. Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C34	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C35	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C36	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C37	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C38	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C39	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C40	"	Crystal Relay Bypass	Capacitor	.005 mfd	GMV	CL	D6-502*	600 W.V.
C41	A-955	PA Screen Bypass	Capacitor	.002 mfd	GMV	CL	D6-202*	600 W.V.
C42	"	PA Screen Bypass	Capacitor	.002 mfd	GMV	CL	D6-202*	600 W.V.
C43	A-948	Buffer Plate Blocking	Capacitor	.001 mfd	+ 50% -20%	CL	DA-858S*	5 K.V.
C44	A-948	PA Plate Blocking	Capacitor	.001 mfd	+ 50% -20%	CL	DA-858S*	5 K.V.
C45	A-948	R.F. Plate Bypass	Capacitor	.001 mfd	+ 50% -20%	CL	DA-858S*	5 K.V.
C46	A-956	P.A. Plate Tuning	Capacitor	.0001 mfd	5%	CL	DA-850S*	5 K.V. N750
C47	"	P.A. Plate Tuning	Capacitor	.0001 mfd	5%	CL	DA-850S*	5 K.V. N750
C48	"	P.A. Plate Tuning	Capacitor	.0001 mfd	5%	CL	DA-850S*	5 K.V. N750
C49	A-958	P.A. Plate Tuning	Capacitor	.00005 mfd	5%	CL	DA-850S*	5 K.V. NPO
C50	A-957	P.A. Plate Tuning	Capacitor	.000075 mfd	5%	CL	DA-850S*	5 K.V. NPO
C51	"	P.A. Plate Tuning	Capacitor	.000075 mfd	5%	CL	DA-850S*	5 K.V. NPO
C52	"	P.A. Plate Tuning	Capacitor	.000075 mfd	5%	CL	DA-850S*	5 K.V. NPO
C53	A-958	P.A. Plate Tuning	Capacitor	.00005 mfd	5%	CL	DA-850S*	5 K.V. NPO
C54	"	P.A. Plate Tuning	Capacitor	.00005 mfd	5%	CL	DA-850S*	5 K.V. NPO
C55	"	P.A. Plate Tuning	Capacitor	.00005 mfd	5%	CL	DA-850S*	5 K.V. NPO

* Or equivalent
** Guaranteed minimum value

AEROCOM — 3090 DOUGLAS ROAD - MIAMI 33, FLORIDA

MODEL AT-144 TRANSMITTER CHECK SHEET

DATE NOVEMBER 19, 1958

P. O. B52614 (3) AB40865 (9)

CUSTOMER TRANS WORLD AIRLINE, INC. (CRAF-2) #858

SERIAL NO. THA DWG. 1-56313-1

CHAN	CRYSTAL AND CARRIER FOR. A	B	D	C	E	F	MEASURED FREQUENCY AT ROOM TEMPERATURE A	B	C	D	E	F	CARRIER POWER (WATTS) OUTPUT INTO 52 OHM RESISTIVE LOAD A	B	C	D	E	F
1	13215.5	13134.5	13186.5	13186.5	13244.5	13244.5	13215.695	13244.588	13259.466	13244.383	13291.326	13314.657						
2	3481.5	3467.5	3440	3440	3481.5	3481.5	3481.471	3467.486	3411.474	3453.488	3409.492	3432.477						
3	3067	3023.5	3040				3067.039	3053.525	2965.972									
4	5506.5	5551.5	5551.5	5488	5566.5	5611.5	5506.430	5551.517	5551.452	5588.397	5566.508	5611.407						
5	4731.5	4724.5	4681.5	4654.5			4731.473	4724.472	4681.481	4654.437								
6	3137	3144					3137.017	3144.012										
7	5626.5	5710.5	5603.5	5683.5	5671.5	5641.5	5626.587	5710.487	5603.726	5683.623	5671.541	5641.485						
8	6737	6730.5	6760.5				6737.962	6730.376	6760.473									
9	8913.5	8862.5	8930.5	8820.5	8845.5	8819.5	8913.513	8862.485	8930.381	8820.647	8845.516	8819.959						
10	11180.5	11228	11356.5		11299.5		11180.413	11228.039	11356.571		11299.477							
11	2945	2987	2973	2952	2931		2945.092	2987.040	2972.998	2952.038	2931.021							
12	2868	2910	2898	2854			2868.011	2910.006	2888.992	2854.622								
13	10090		10021				10021.098		10021.049									
14	15011	15098	15011				15015.916	15026.086	15016.057									
15		2944	2987					2987.011	2987.011									
16	17906.5	17926.5	17975	17943.5	17966.5	17966.5	17906.801	17926.262	17975.118	17943.698	17966.657	17966.292						
17			4890		4890				4889.947		4890.005							
18	6577	6587	6582	6612			6537.012	6566.941	6582.033	6612.025								
19	8939	8871	8913.5	8854	8879.5	8836.5	8939.006	8871.041	8913.459	8854.003	8879.517	8836.842						
20		6753	6664					6753.001	6664.486									
21	13274.5	13264.5	13304.5	13324.5	13294.5	13245.5	13274.477	13264.486	13304.313	13324.466	13294.397	13245.557						
22	8888	8956	9026.5				8888.204	8956.165	9026.445									
23	2182						2182.020											
24	5498	5521.5	5588	5619	5543.5	5581.5	5498.958	5521.452	5588.902	5619.035	5543.925	5581.434						

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.
3090 S.W. 37th Ave. Miami 33, Florida

FREQUENCY PLAN
AT-144 # 858

AEROCOM — 3090 DOUGLAS ROAD - MIAMI 33, FLORIDA

MODEL AT-144 TRANSMITTER CHECK SHEET

DATE NOVEMBER 19, 1958

P. O. B52614 (3) AB40865 (9)

CUSTOMER TRAC RADIO ATELIER, INC. (ORDER-1) # 864

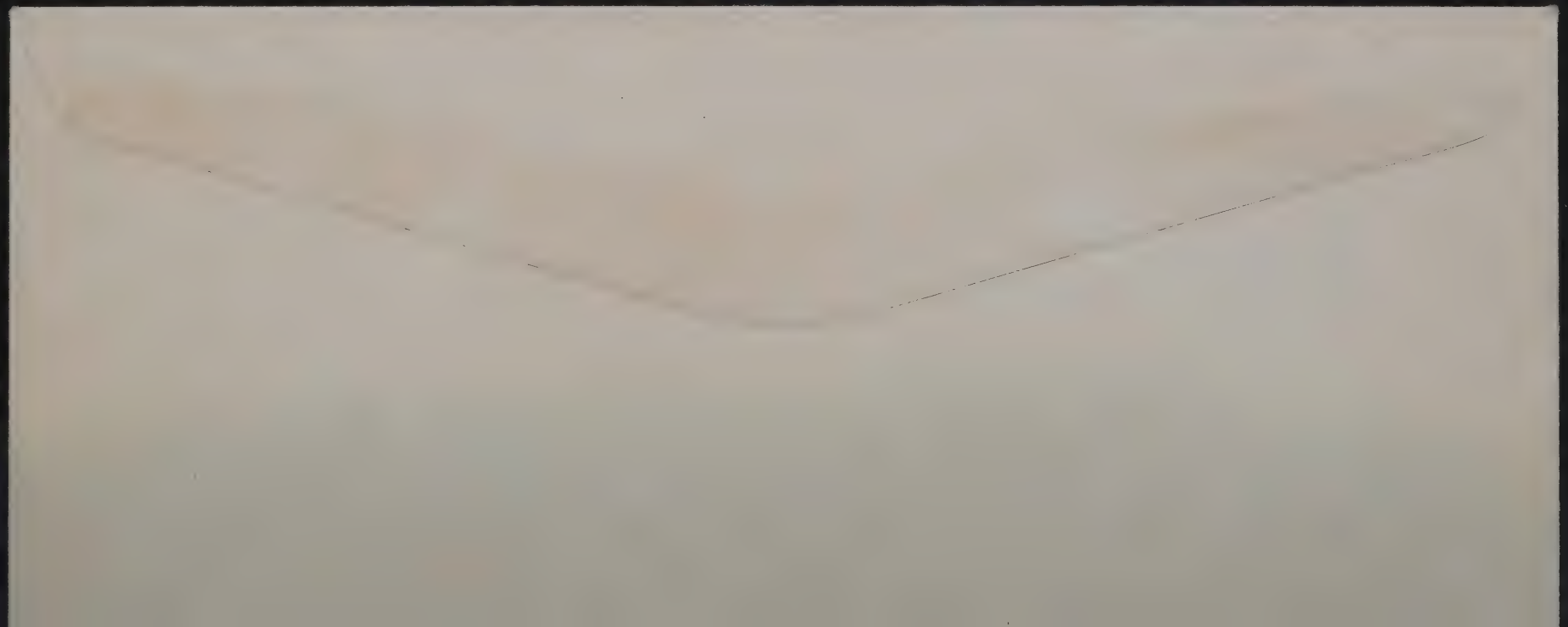
SERIAL NO. TRA DWG. 1-56313-1

CRYSTAL AND CARRIER FREQ.						MEASURED FREQUENCY AT ROOM TEMPERATURE						CARRIER POWER (WATTS) OUTPUT INTO 52 OHM RESISTIVE LOAD					
A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
13211.5	13334.5	13456.5	13744.5	13205.5	13336.5	13215525	13334631	13351492	13344881	13299397	13317684						
3481.5	3467.5	3421.5	3459.5	3407.5	3432.5	3481496	3467585	3411551	3453592	3409540	3432511						
3060	3034.5	3066				3067047	3023537	2966D10									
5506.5	5551.5	5597.5	5580	5606.5	5631.5	5506457	5551436	5551182	5588926	5566824	5611486						
4731.5	4724.5	4699.5	4682.5			4731527	4704417	4687367	4654392								
3147	3144					3137066	3144005										
5626.5	5703.5	5606	5695	5597.5	5641.5	5626507	5710428	5704027	5674906	5671517	5641474						
6741	6741.5	6661.5				6737993	6736468	6760528									
8913.5	8862.5	8930.5	8920	8815.5	8880	8913438	8862406	8930904	8811928	8845381	8819984						
11180.5	11228	11356		11299.5		11180681	11228014	11356323		11299707							
2994	2987	2973	2952	2931		2994503	2987047	2973006	2952003	2931005							
2868	2911	2889	2853			2868021	2910031	2889008	2853993								
10021		10020				10021205		10020988									
15016	15036	15016				15016134	15036194	15016066									
							2987029	2986994									
17906.5	17926	17977.5	17993	17916.5	17966.5	17906666	17926597	17977115	17993432	17916480	17966480						
		4890		4889				4890608		4889923							
6517	6567	6582	6612			6536977	6566954	6581875	6611977								
8939	8871	8913.5	8854	8879.5	8837	8939023	8870906	8913969	8859013	8879913	8836905						
	6753	6664.5					6752975	6664943									
13274.5	13264.5	13304.5	13324.5	13254.5	13285.5	13274341	13264674	13304716	13324692	13284570	13285312						
8894	8958	9006.5				8888149	8956052	9026732									
2192						2182031											
5498	5522.5	5595	5610	5544	5581.5	5498988	5521414	5588936	5619003	5543974	5581464						

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.
3090 S.W. 37th Ave. Miami 33, Florida

FREQUENCY PLAN

~~AT-144~~ AT-144



SYMBO.	AEROCOM PT. NO.	FUNCTION	NAME OF PART	DESCRIPTION VALUE	TOL.	MFG *	TYPE *	REMARKS
C56	A-959	P.A. Plate Tuning	Capacitor	.00002 mfd	5%	CL	DA853* Axial Wire Lead	5KV NPO
C57	A-960	P.A. Plate Tuning	Capacitor	.00001 mfd	5%	CL	DA853* " "	5KV NPO
C58	A-961	P.A. Plate Tuning	Capacitor	.000003 mfd	5%	CL	DA853* " "	5KV NPO
C59	A-962	Low Pass RF Filter	Capacitor	.00012 mfd	5%	EE	357*	500 WV N750
C60	A-962	Low Pass RF Filter	Capacitor	.00012 mfd	5%	EE	357*	500 WV N750
C61	A-963	Crystal Correlation	Capacitor	2.5 -13 mmfd		CL	822BZ*	
C62	A-963	Buffer Plate Loading	Capacitor	2.5 -13 mmfd		CL	822BZ*	
C63	A-964	Buffer Plate Loading	Capacitor	5-50 mmfd		CL	822AN*	
C64	A-964	Buffer Plate Loading	Capacitor	5-50 mmfd		CL	822AN*	
C65	A-965	Crystal Correlation	Capacitor	8 mmfd	1 mmfd	EE	NPOK*	
C66	A-965	Sidetone RF Voltage Divider	Capacitor	8 mmfd	1 mmfd	EE	NPOK*	
C67	A-966	P.A. Loading	Capactior	.0051 mfd	5%	CD	1D 125°C*	Foil Mica
C68	A-967	P.A. Loading	Capacitor	.003 mfd	5%	CD	1D 125°C*	Foil Mica
C69	A-968	P.A. Loading	Capacitor	.0022 mfd	5%	CD	1D 125°C*	Foil Mica
C70	"	P.A. Loading	Capacitor	.0022 mfd	5%	CD	1D 125°C*	Foil Mica
C71	"	P.A. Loading	Capacitor	.0022 mfd	5%	CD	1D 125°C*	Foil Mica
C72	A-969	Ext. Freq. Coupling	Capacitor	.001 mfd	5%	EL	603-J*	Silver Mica
C73	A-980	P.A. Grid Coupling	Capacitor	.001 mfd	5%	EL	602-J*	Silver Mica
C74	A-969	Sidetone RF Coupling	Capacitor	.001 mfd	5%	EL	603-J*	Silver Mica
C75	A-970	Buffer Plate Tuning	Capacitor	.00047 mfd	5%	EL	603-J*	Silver Mica
C76	A-971	P.A. Loading	Capacitor	.00039 mfd	5%	CD	5R 125°C*	Silver Mica
C77	A-972	Audio Band Pass Filter	Capacitor	.00025 mfd	5%	EL	603-J*	Silver Mica
C78	"	Audio Band Pass Filter	Capacitor	.00025 mfd	5%	EL	603-J*	Silver Mica
C79	"	RF Amp. Grid Coupling	Capacitor	.00025 mfd	5%	EL	603-J*	Silver Mica
C80	"	Buffer Grid Coupling	Capacitor	.00025 mfd	5%	EL	603-J*	Silver Mica
C81	A-982	Buffer Plate Tuning	Capacitor	.00027 mfd	5%	EL	603-J*	Silver Mica
C82	A-972	Sidetone RF Bypass	Capacitor	.00025 mfd	5%	EL	603-J*	Silver Mica 500 WV
C83	A-973	Buffer Plate Loading	Capacitor	.0002 mfd	5%	EL	603-J*	Silver Mica 500 WV
C84	A-978	Buffer Plate Tuning	Capacitor	.00005 mfd	5%	EL	603-J*	Silver Mica 500 WV
C85	A-973	Buffer Plate Tuning	Capacitor	.0002 mfd	5%	EL	603-J*	Silver Mica 500 WV
C86	A-975	Buffer Plate Tuning	Capacitor	.00016 mfd	5%	EL	603-J*	Silver Mica 500 WV

*Or equivalent

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
C87	A-981	P.A. Loading	Capacitor	.00016 mfd	5%	CD	5R 125°C	Silver Mica 500 WV
C88	A-981	P.A. Loading	Capacitor	.00016 mfd	5%	CD	5R 125°C	Silver Mica 500 WV
C89	A-975	Audio Band Pass Filter	Capacitor	.00016 mfd	5%	EL	603-J*	Silver Mica 500 WV
C90	A-976	Oscillator Cathode Regeneration	Capacitor	.0001 mfd	5%	EL	603-J*	Silver Mica 500 WV
C91	A-976	Audio Band Pass Filter	Capacitor	.0001 mfd	5%	EL	603-J*	Silver Mica 500 WV
C92	A-977	Buffer Plate Loading	Capacitor	.000075 mfd	5%	EL	603-J*	Silver Mica 500 WV
C93	A-978	Buffer Plate Tuning	Capacitor	.00005 mfd	5%	EL	603-J*	Silver Mica 500 WV
C94	A-977	L22 Shunt	Capacitor	.000075 mfd	5%	EL	603-J*	Silver Mica 500 WV
C95	A-979	Buffer Plate Loading	Capacitor	.000025 mfd	5%	EL	603-J*	Silver Mica 500 WV
C96	A-947	F1 Bypass	Capacitor	.01 mfd	GMV**	CL	D6-103*	600 W.V.
C97	A-947	F2 Bypass	Capacitor	.01 mfd	GMV**	CL	D6-103*	600 W.V.

* Or equivalent
** Guaranteed minimum value

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
CR1	A-7305	Sidetone Rectifier	Germanium Crystal			SYL	1N34-A	
CR2	A-7305	Sidetone Rectifier	Germanium Crystal			SYL	1N34-A	
E1	A-844	Audio Test Point	Tip Jack			JOH	#105-603-1	Nylon
F1	A-576	Control Circuit Prot.	Fuse	5 amp		LF	3AG	SLO-BLO
F2	A-577	Filament Circuit Prot.	Fuse	10 amp		LF	3AG	SLO-BLO
F3	A-577	Filaments-Spare	Fuse	10 amp		LF	3AG	SLO-BLO
F4	A-576	Control Circuits-Spare	Fuse	5 amp		LF	3AG	SLO-BLO
J1	A-832	Main Cable	Connector			CAN	DPD-A32-33S	In shockmount
J2	A-832	Main Cable	Connector			CAN	DPD-A32-33S	In shockmount
J3	A-829	Audio Chassis Disconnect	Connector			JON	P312AB	On main chassis
J4	A-833	Control Relay Assy. Disconnect	Connector			WIN	MRE41P	On main chassis
J5	A-843	R.F. Exciter Assy. Disconnect	Connector			WIN	MRE18P	On main chassis
J6	A-841	Band Solenoid Assy. Disconnect	Connector			WIN	MRE18S	Pt. of ass'by
J7	A-835	Crystal Drum Disconnect	Connector			DJA	C9-20S	On main chassis
J8	A-836	Microphone Jack	Connector			CAR	JK-33A	
J9	A-837	Phones Jack	Connector			CAR		Midget-open circuit
J10	A-838	Ext. Control Freq. Input	Connector			IPC	#5000/BNC (w/#5300CAP)	Modified
J11	8A-1808	R.F. Output	Connector			AMP	83-1R	
J12	8A-1808	Ant. Out to Receiver	Connector			AMP	83-1R	

* Or equivalent

SYMBOL	AEROCOM PT. NO.	DESCRIPTION FUNCTION	NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
K1	A-2021	Keying Relay	Relay	160 ohm coil		LCH	1077CBF	3PDT 22-30 VDC
K2	A-2013	External Frequency Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K3	A-2022	Fil/Blow/Dyn. Start	Relay	410 ohm coil		ADV	Type 1604A Spec 1088	DPDT
K4	A-2018	P.A. Grid (Tuning Control)	Relay	150 ohm coil		SIG	7J0Z-160T	SPDT
K5	A-2013	"A" Crystal Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K6	A-2013	"B" Crystal Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K7	A-2013	"C" Crystal Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K8	A-2013	"D" Crystal Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K9	A-2013	"E" Crystal Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K10	A-2013	"F" Crystal Selector	Relay	150 ohm coil		ADV	Type 003 Spec 2475-2	
K11	A-2023	A-B Selector Interlock	Relay	150 ohm coil		PB	MH-1894-1	2PDT
K12	A-2019	A-B Selector Interlock	Relay	245 ohm coil		PB	MH-1892	2PDT
K13	A-2019	A-B Selector Interlock	Relay	245 ohm coil		PB	MH-1892	2PDT
K14	A-2019	Sequence Solenoid OFF	Relay	245 ohm coil		PB	MH-1892	2PDT
K15	A-2024	Tuner-Trans. Operate	Relay	245 ohm coil		PB	MH-1893	4PDT
K16	A-2024	Band Switch Interlock	Relay	245 ohm coil		PB	MH-1893	4PDT
K17	A-2019	K4 Disabling	Relay	245 ohm coil		PB	MH-1892	2PDT
K18	A-2019	Drum Control	Relay	245 ohm coil		PB	MH-1892	2PDT
K19	A-2024	Vario. Tune Interlock	Relay	245 ohm coil		PB	MH-1893	4PDT
K20	A-2024	Vario. Tune Interlock	Relay	245 ohm coil		PB	MH-1893	4PDT
K21	A-2024	Press to Talk	Relay	245 ohm coil		PB	MH-1893	4PDT
K22	A-2019	Solenoid Operate	Relay	245 ohm coil		PB	MH-1892	2PDT
K23	A-2019	Solenoid Operate-Interlock	Relay	245 ohm coil		PB	MH-1892	2PDT
K24	A-2024	Time Delay Interlock	Relay	245 ohm coil		PB	MH-1893	4PDT

* Or equivalent

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG	TYPE*	REMARKS
KS1	A-2025	Sequence Switch Drive	Rotary Solenoid			LE	Ledex 5ESR35-26*	Dwg. IDS-1993
KS2	A-2025	R.F. Band Switch Drive	Rotary Solenoid			LE	Ledex 5ESR35-26*	Dwg. IDS-1993
L1	A-9161	Audio Band Pass Filter	Choke			UTC	VI-C15*	Variable Inductor
L2	A-9161	Audio Band Pass Filter	Choke			UTC	VI-C15*	Variable Inductor
L3	A-9162	R.F. Amplifier Plate	Choke	2.5 MH-125 MA		LIN	M-0275*	
L4	A-9162	Buffer Plate	Choke	2.5 MH-125 MA		LIN	M-0275*	
L5	A-9162	P.A. Grid	Choke	2.5 MH-125 MA		LIN	M-0275*	
L6	A-9163	Sidetone R.F. Filter	Choke	2.5 MH-125 MA		NTL	R-100*	
L7	AR-5561	P.A. Plate	Choke			AER	AT-144 #30*	
L8	AR-5562	R.F. Low Pass Filter	Coil			AER	AT-144 #116*	
L9	AR-5562	R.F. Low Pass Filter	Coil			AER	AT-144 #116*	
L10	AR-5562	R.F. Low Pass Filter	Coil			AER	AT-144 #116*	
L11	AR-5563	Buffer Plate	Variometer			CCC	ART-13	Modified per Dwg. AT-144 #112
L12	AR-5564	P.A. Plate	Variometer			CCC	ART-13	"
L13	AR-5565	Oscillator Plate	Coil			AER	AT-144 #110 It. 5*	Band 5
L14	AR-5566	Oscillator Plate	Coil			AER	AT-144 #110 It. 9*	Band 6
L15	AR-5567	Oscillator Plate	Coil			AER	AT-144 #110 It. 10*	Band 7
L16	AR-5568	Oscillator Plate	Coil			AER	AT-144 #110 It. 11*	Band 8
L17	AR-5569	R.F. Amplifier Plate	Coil			AER	AT-144 #110 It. 4*	Band 4
L18	AR-5566	R.F. Amplifier Plate	Coil			AER	AT-144 #110 It. 9*	Band 5

* Or equivalent

AT-144 PARTS LIST - ELECTRICAL

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
L19	AR-5570	R.F. Amplifier Plate	Coil			AER	AT-144 #110 It. 6*	Band 6
L20	AR-5571	R.F. Amplifier Plate	Coil			AER	AT-144 #110 It. 3*	Band 7
L21	AR-5572	R.F. Amplifier Plate	Coil			AER	AT-144 #110 It. 8*	Band 8
L22	AR-5573	Buffer Plate	Coil			AER	AT-144 #110 It. 1*	Band 1
L23	AR-5574	Buffer Plate	Coil			AER	AT-144 #110 It. 2*	Band 2
L24	AR-5574	Buffer Plate	Coil			AER	AT-144 #110 It. 2*	Band 3
L25	AR-5571	Buffer Plate	Coil			AER	AT-144 #110 It. 3*	Band 4
L26	AR-5571	Buffer Plate	Coil			AER	AT-144 #110 It. 3*	Band 5
L28	AR-5576	P.A. Plate	Coil			AER	AT-144 #108*	
L29	AR-5577	P.A. Band 8 Loading Compensator	Coil			AER	AT-144 #109 It. 1*	
M	A-1806	Circuit Metering	Meter	0-1 MA	100 ohm DJA Mod. 112*			Scale per AT-144 #40
MS1	A-2330	Tuning Sequence Control	Switch			MS	1SM1*	JS-5 Actuator
MS2	A-2330	Tuning Sequence Control	Switch			MS	1SM1*	JS-5 "
MS3	A-2330	Tuning Sequence Control	Switch			MS	1SM1*	JS-5 "

* Or equivalent

SYMBOL	AEROCOM PT. NO.	DESCRIPTION FUNCTION	NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
01	AR-5878	Drum Control	Clutch/Brake			FW	56100	Modified per Dwg. AT-144 #31
02	AR-5878	Variometer Control	Clutch/Brake			FW	56100	"
P1	AR-5865	Main Cable	Connector			CAN	DPD A32 34P	Modified per Dwg. AT-144 #16
P2	AR-5865	Main Cable	Connector			CAN	DPD A32 34P	" "
P3	A-839	Audio Chassis Disconnect	Connector			JON	S312AB	
P4	A-840	Control Relay Assy Disconnect	Connector			WIN	MRE 41S	Pt. of assembly
P5	A-841	R.F. Exciter Assy Disconnect	Connector			WIN	MRE 18S	Pt. of assembly
P6	A-834	Band Solenoid Assy Disconnect	Connector			WIN (with 18H Hood)	MRE 18P	On main cable (Hood per AT-144 #33)
P7	A-842	Drum Control Disconnect	Connector			DJA	C-9-20P VS/38	Pt. of assembly
R1	A-7053	Filament	Resistor	122 ohms	2%	WL	O-2	15W
R2	A-7054	Filament	Resistor	.72 ohms	2%	WL	B-2-5/16"	28W
R3	A-7055	Filament	Resistor	20 ohms	2%	WL	T-2	20 W
R4	A-7056	Filament	Resistor	24 ohms	2%	WL	T-2	20 W
R5	A-7056	Filament	Resistor	24 ohms	2%	WL	T-2	20 W
R6	A-7056	Filament	Resistor	24 ohms	2%	WL	T-2	20 W
T7	A-7057	Audio Plate Bleeder	Resistor	10K ohms	5%	WL	20F	20 W
R8	A-7058	Audio Plate Dropping	Resistor	3K ohms	5%	WL	20F	20 W
R9	A-7059	R.F. Amplifiers Grid Bias	Resistor	2250 ohms	2%	WL	T-2	20 W

* Or equivalent

SYMBOL	AEROCOM PT. NO	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
R10	A-7060	P.A. Screen Dropping	Resistor	6K Ohms	5%	WL	20F	20W
R11	A-7045	R.F. Exciter Plate Dropping	Resistor	5K Ohms	5%	WL	25F	25 W
R12	A-7045	R.F. Exciter Plate Bleeder	Resistor	5K Ohms	5%	WL	25F	25 W
R13	A-7061	Filament	Resistor	23 Ohms	2%	WL	Z1-5/8	10 W
R14	A-7062	Filament	Resistor	42 Ohms	2%	WL	Y-7/8	5 W
R15	A-7063	R.F. Amplifiers Grid Bias	Resistor	300 Ohms	5%	WL	Y-7/8	5 W
R16	A-7064	R.F. Amplifiers Grid Bias	Resistor	450 Ohms	5%	WL	Y-7/8	5 W
R17	A-7065	Metering	Resistor	1 Ohm	1%	SHC	172	
R18	A-7066	Audio Gain	Resistor	50K Ohms		AB	JLA-5031	Curve A
R19	A-7067	Tuning Sensitivity	Resistor	1K Ohms	10%	CLS	CM 12103 43-1000	S. Taper
R20	A-7068	Sidetone Output	Resistor	2K Ohms	10%	CLS	CM 12102 43-2000	S. Taper
R21	A-7068	Clipping Adjustment	Resistor	2K Ohms	10%	CLS	CM 12102 43-2000	S. Taper
R22	A-7069	Metering	Resistor	100 Ohms	2%	ELT	DC-1	1 W
R23	A-7070	Metering	Resistor	2800 Ohms	2%	ELT	DC-1	1 W
R24	A-7071	Metering	Resistor	400 Ohms	2%	ELT	DC-1	1 W
R25	A-7072	Metering	Resistor	50K Ohms	2%	ELT	DC-1	1 W
R26	AR-5893	P.A. Grid Parasitic	Resistor Assembly	7 turns #24 tinned wire wound on 39 ohms (ELT-DC1/2A*) Resistor				±5% 1/2 W
R27	AR-5893	P.A. Grid Parasitic	Resistor Assembly	" "	"	"	"	"
R28	A-7074	P.A. Screen Parasitic	Resistor	39 Ohms	5%	ELT	DC 1/2	1/2 W
R29	A-7074	P.A. Screen Parasitic	Resistor	39 Ohms	5%	ELT	DC 1/2	1/2 W
R30	A-7075	Step Down Tuning	Resistor	120 Ohms	5%	ELT	DC 1/2A	1/2 W
R31	A-7076	Step Down Tuning	Resistor	330 Ohms	5%	ELT	DC 1/2A	1/2 W
R32	A-7077	V6 Cathode	Resistor	390 Ohms	5%	ELT	DC 1/2A	1/2 W
R33	A-7078	Step Down Tuning	Resistor	820 Ohms	5%	ELT	DC 1/2A	1/2 W
R34	A-7079	Sidetone Load	Resistor	2K Ohms	5%	ELT	DC 1/2	1/2 W
R35	A-7080	V6 Plate Decoupling	Resistor	10K Ohms	5%	ELT	DC 1/2A	1/2 W
R36	A-7080	R.F. Amplifier Grid	Resistor	10K Ohms	5%	ELT	DC 1/2A	1/2 W

* Or equivalent

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
R37	A-8081	Buffer Grid	Resistor	3900 ohms	5%	ELT	DC-1/2A	1/2 W
R38	A-8082	Oscillator Screen Dropping	Resistor	24K ohms	5%	ELT	DC-1/2A	1/2 W
R39	A-8083	V6 Plate Loading	Resistor	39K ohms	5%	ELT	DC-1/2A	1/2 W
R40	A-8084	Oscillator Grid	Resistor	100K ohms	5%	ELT	DC-1/2A	1/2 W
R41	A-8085	Oscillator Cathode	Resistor	8200 ohms	5%	ELT	DC-1/2A	1/2 W
R42	A-8086	V6 Screen	Resistor	150K ohms	5%	ELT	DC-1/2A	1/2 W
R43	A-8086	6005 Grid	Resistor	150K ohms	5%	ELT	DC-1/2A	1/2 W
R44	A-8087	Drum Clutch Coil Filter	Resistor	22 ohms	5%	ELT	DC-1/2A	1/2 W
R45	A-8087	Vario. Clutch Coil Filter	Resistor	22 ohms	5%	ELT	DC-1/2A	1/2 W
R46	A-8088	6005 Cathode	Resistor	330 ohms	5%	ELT	DC-1	1 W
R47	A-8089	Microphone Current Limiting	Resistor	1200 ohms	5%	ELT	DC-1	1 W
R48	A-8090	Tuning Sensitivity	Resistor	2500 ohms	5%	ELT	DC-1/2A	1/2 W
R49	A-8091	Oscillator Plate Dropping	Resistor	3900 ohms	5%	ELT	DC-1	1 W
R50	A-8091	P.A. Grid Circuit	Resistor	3900 ohms	5%	ELT	DC-1	1 W
R51	A-8092	6146 Screen Dropping	Resistor	10K ohms	5%	ELT	DC-1	1 W
R52	A-8093	6146 Screen Bleeder	Resistor	15K ohms	5%	ELT	DC-1	1 W
R53	A-8094	Sidetone Rectifier Current Limiting	Resistor	400 ohms	2%	ELT	DC-1	1 W
R54	A-7072	Metering (R.F. Out)	Resistor	50K ohms	2%	ELT	DC-1	1 W
R55	A-8095	Sidetone R.F. Voltage Divider	Resistor	5000 ohms	5%	ELT	DC-1	1 W
R56	A-8096	Sidetone R.F. Voltage Divider	Resistor	1500 ohms	5%	ELT	DC-2	2 W
R57	A-8097	Buffer Grid Parasitic	Resixtor	5 ohms	5%	CC	NF-1/2	1/2 W
R58	A-7077	Buffer Screen Parasitic	Resistor	390 ohms	5%	ELT	DC-1/2A	1/2 W
R60	A-8098	R.F. Amplifier Coil Shunt	Resistor	2000 ohms	5%	ELT	DC-1/2	1/2 W
R61	A-8098	Oscillator Plate	Resistor	2000 ohms	5%	ELT	DC-1/2	1/2 W
R62	A-8086	Audio Gain Divider	Resistor	150K ohms	5%	ELT	DC-1/2A	1/2 W
R63	A-7104	Motor Volt Dropping	Resistor	10 ohms	5%	WL	Z-1-5/8	8 W (Tapped 5 ohms)
R64	A-8101	Exciter Input Terminal	Resistor	400 ohms	2%	ELT	DC-1	1 W
R65	A-8090	Tuning Sensitivity	Resistor	2500 ohms	5%	ELT	DC-1/2A	1/2 W

* Or equivalent

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL	MFG *	TYPE *	REMARKS
S1A	A-2331	Sequence Solenoid Control	Switch: Wafer			OAK	50680-H*	
S1B	A-2332	Tuner Information	Switch: Wafer			OAK	50681-H*	
S1C	A-2333	Step-Down Tuning	Switch: Wafer			OAK	50679-H*	
S1D	A-2333	Motor Control	Switch: Wafer			CAK	50679-H*	
S1E	A-2333	L.V. (27.5 VDC) Control	Switch: Wafer			OAK	50679-H*	
S1F	A-2333	Sequence Tuning Interlock	Switch: Wafer			OAK	50679-H*	
S1G	A-2333	Spare	Switch: Wafer			OAK	50679-H*	
S2A	A-2334	Oscillator Plate	Switch: Wafer			OAK	50678-DHC*	
S2B	A-2334	R.F. Amplifier Plate	Switch: Wafer			OAK	50678-DHC*	
S2C	A-2334	Buffer Plate	Switch: Wafer			OAK	50678-DHC*	
S2D	A-2334	Buffer Plate	Switch: Wafer			OAK	50678-DHC*	
S2E	A-2334	Buffer Plate	Switch: Wafer			OAK	50678-DHC*	
S2G	AR-5878	P.A. Plate	Switch: Wafer			AER	AT-144 #144*	
S2H	AR-5878	P.A. Plate	Switch: Wafer			AER	AT-144 #144*	
S2I	A-2334	P.A. Plate	Switch: Wafer			OAK	50678-DHC*	
S2J	A-2333	Tuner Band Information	Switch: Wafer			OAK	50679-H*	
S2K	A-2333	Band Solenoid Control	Switch: Wafer			OAK	50679-H*	
S3	A-2335	Crystal Drum Position Control	Switch: Wafer			OAK	48537-MF*	
S4	A-2336	Manual Tune Control	Switch: Toggle			AK	ST52R*	
S5	AR-5879	Metering Switch	Switch: Assembly (Wafer, 2 pole 5 pos., non-shorting ceramic, Centralab)			AER	AT-144 #143*	

* Or equivalent

AT-144 PARTS LIST - ELECTRICAL

SYMBOL	AEROCOM PT. NO.	FUNCTION	NAME OF PART	VALUE	TOL	DESCRIPTION MFG *	TYPE *	REMARKS
S6	A-2337	KS1 Operating Contactor	Switch: Wafer			LE	Ledex CDS-372	
S7	A-2337	KS2 Operating Contactor	Switch: Wafer			LE	Ledex CDS-372	
T1	A-9164	Microphone Input	Transformer			UTC	H-2	
T2	A-9165	Driver	Transformer			GE	7472064	
T3	A-9166	Modulation	Transformer			CHI	9200B	Modified per AT-144 #137
TB1	AR-5880	H.V. Metering	Terminal Board			AER	AT-144 #91 It. 1	
TB2	AR-5881	Sidetone Rectifier Cirouit	Terminal Board			AER	AT-144 #92	
TB3	AR-5882	Misc. Junctions	Terminal Board			AER	AT-144 #99 It. 2	
TB4	AR-5883	Misc. Resistors	Terminal Board			AER	AT-144 #91	
TB5	AR-5884	Step-down Tuning Resistors	Terminal Board			AER	AT-144 #90	
TD1	A-2026	Time Delay	Relay			EUR	26.5-60-C)	Use either but
TD1	A-2029	Time Delay	Relay			AMPERITE	26N060T)	not both.
X1	A-2119	Test Crystal	Socket			JOH	126-105	
XF	A-2118		Fuse Holder			LF	#342003	Four req'd per AT-144

* Or equivalent

AT-144 PARTS LIST - ELECTRICAL

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL.	MFG*	TYPE*	REMARKS
Z1	AR-5869	R.F. Exciter	Assembly			AER	AT-144 #P-125, P-126, P-127*	
Z2	AR-5870	Audio	Assembly			AER	AT-144 #P-130*	
Z3	AR-5871	Control Relay	Assembly			AER	AT-144 #P-131*	
Z4	AR-5872	Band Solenoid	Assembly			AER	AT-144 #118*	
Z5	AR-5873	Drum Control Switch	Assembly			AER	AT-144 #136*	
Z6	AR-5885	Sidetone Rectifier	Assembly			AER	AT-144 #141*	
Z7	AR-5886	PA RF Switch	Assembly			AER	AT-144 #144*	
V1	A-3005	R.F. Oscillator	Vacuum Tube			GE	5654*	
V2	A-3020	R.F. Amplifier	Vacuum Tube			RCA	6146*	
V3	A-3020	R.F. Buffer	Vacuum Tube			RCA	6146*	
V4	A-3002	R.F. Power Amplifier	Vacuum Tube			EIM	4-65A*	
V5	A-3002	R.F. Power Amplifier	Vacuum Tube			EIM	4-65A*	
V6	A-3005	Audio Speech Amplifier	Vacuum Tube			GE	5654*	
V7	A-3021	Audio Speech Clipper	Vacuum Tube			GE	5726*	
V8	A-3022	Audio Driver	Vacuum Tube			GE	6005*	
V9	A-3023	Audio Modulator	Vacuum Tube			GE	811-A*	
V10	A-3023	Audio Modulator	Vacuum Tube			GE	811-A*	

* Or equivalent

SYMBOL	AEROCOM PT. NO.	FUNCTION	DESCRIPTION NAME OF PART	VALUE	TOL.	MFG *	TYPE *	REMARKS
See Note Below								
70	AR-5887	R.F. Power Amplifier	Socket: Tube	7 prong	Ceramic	JOH	#122-248 with base shield & 4 springs	Two req'd (shield mod. per AT-144 #88
74	R-2638	Modulator	Socket: Tube	4 prong	Bakelite	AMP	#78-RS4	2 required
130	A-2120	R.F. Osc. Audio Amplifier Audio Clipper Audio Driver	Socket: Tube	7 pin. min.	Ceramic	ELC	#239-BC	4 required
137	R-2536	R.F. Amplifier R.F. Buffer Sensi. Relay K4	Socket: Tube	8 prong Octal	Mica filled Bakelite	AMP	#78-RS8T	3 required
100A	A-2121	Time Delay TD-1	Socket: Tube	9 pin min.	Ceramic	ELC	#177-BC	1 required
105	A-2600		Shield: Tube	7 pin	1-3/8 high	ELC	#121-V	3 required
169	A-2601		Shield: Tube	7 pin	2-1/4 high	ELC	#149-V	1 required
100	A-2602		Shield: Tube	9 pin	1-15/16 hi	ELC	#191-V	1 required

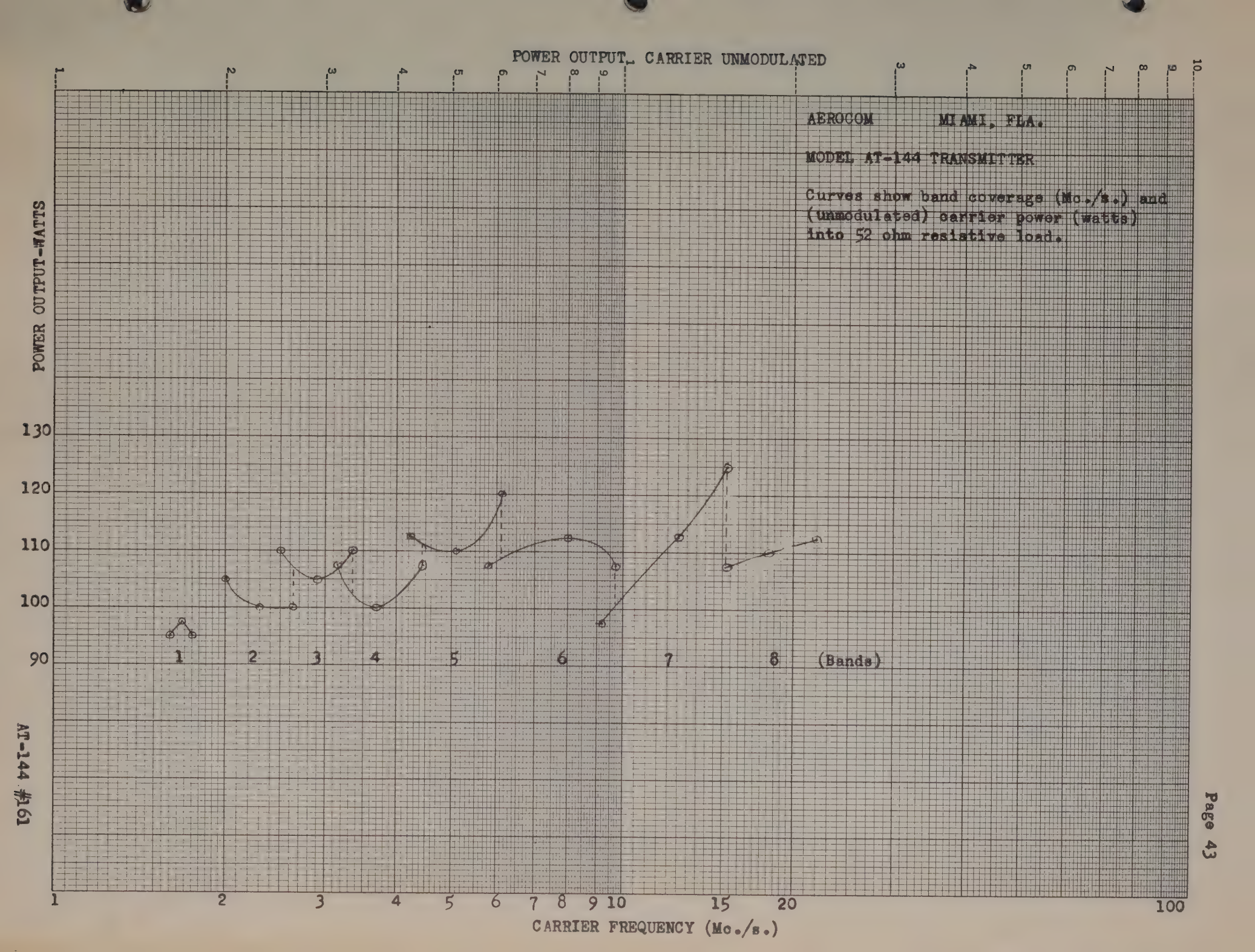
* Or equivalent

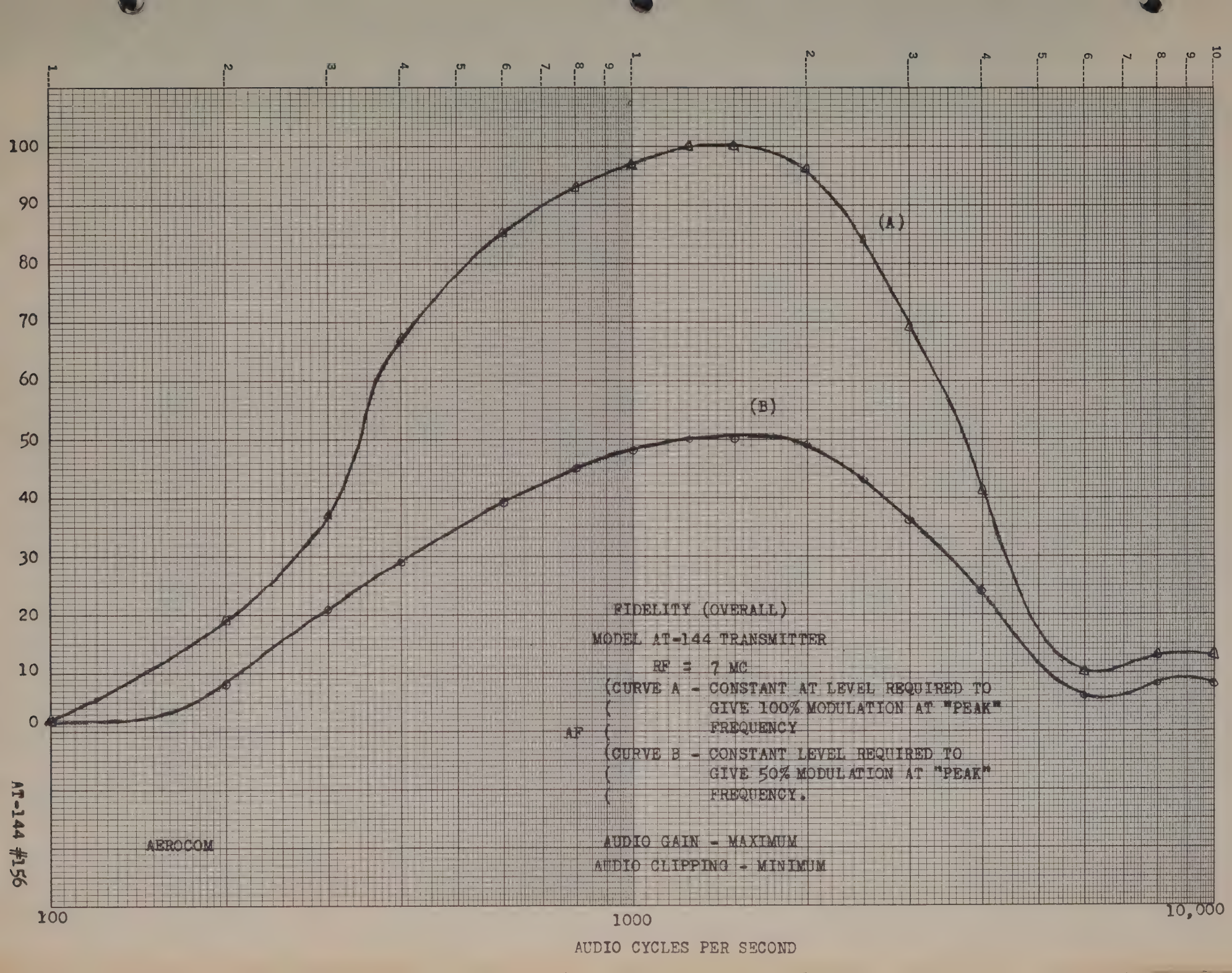
NOTE: These items are also listed in the mechanical parts list and are illustrated in the AT-144 Photographs

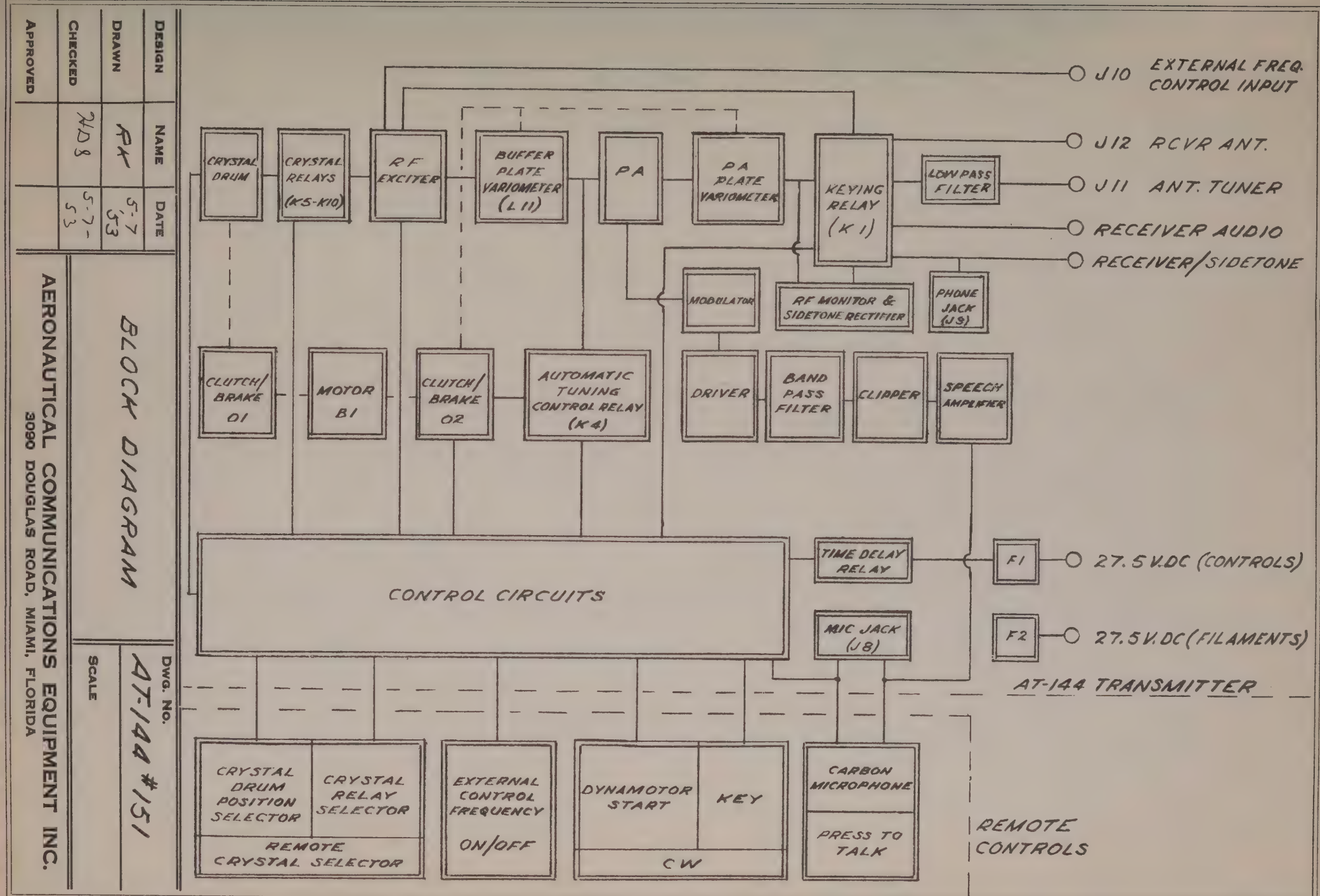
MANUFACTURERS LEGEND

AT-144 TRANSMITTER PARTS LIST (ELECTRICAL)

AB	Allen-Bradley Co., Milwaukee 4, Wisc.
ADV	Advance Electric & Relay Corp., Burbank, Calif.
AER	Aeronautical Communications Equipment, Inc., Miami, Fla.
AK	Ark-Les Switch Corp., Watertown 72, Mass.
AMP	American Phenolic Corp., Chicago, Ill.
AST	Astron Corp., East Newark, N. J.
CAN	Cannon Electric Co., Los Angeles 31, Calif.
CAR	Carter Parts Div., Precision Parts Co., Chicago, Ill.
CC	Continental Carbon, Inc., Cleveland, Ohio
CCC	Communications Coil Co., Chicago, Ill.
CD	Cornell-Dubilier Electric Corp., South Plainfield, N. J.
CHI	Chicago Transformer Co., Chicago, Ill.
CL	Centralab Div., Globe Union, Inc., Milwaukee, Wisc.
CLS	Clarostat Manufacturing Co. Inc., Dover, New Hampshire
DJA	DeJur-Amsco Corp., Long Island City, N. Y.
EE	Erie Resistor Corp., Erie, Pa.
EEP	Electro Engineering Products Co. Inc., Chicago, Ill.
EIM	Eitel-McCullough, Inc., San Bruno,Calif.
EL	Electro Motive Mfg. Co., Willimantic, Conn.
ELC	Elco Manufacturing Co., Philadelphia, Pa.
ELT	Electra Mfg. Co., Kansas City, Mo.
EUR	Eureka Television & Tube Co., Hawthorne, N. J.
FW	Forbes & Wagner, Inc., Silver Creek, N. Y.
GE	General Electric Co., Clifton, N. J.
IPC	Industrial Products Col, Danbury, Conn.
JOH	E. F. Johnson Co., Waseca, Minn.
JON	Howard B. Jones Div. Cinch Mfg. Co., Chicago, Ill.
LCH	Leach Relay Co., Los Angeles, Calif.
LE	G. H. Leland, Inc., Dayton, Ohio.
LF	Littelfuse, Inc., Des Plaines, Ill.
LIN	C. S. Linell Engineering Co., Chicago, Ill.
MS	Microswitch Co., Freeport, Illinois
NTL	National Co., Malden, Mass.
OAK	Oak Mfg. Co., Chicago, Ill.
PB	Potter & Brumfield, Princeton, Ind.
RCA	Radio Corporation of America, Jersey City, N. J.
SC	Stromberg-Carlson Co., Rochester, N. Y.
SHC	Shallcross Mfg. Co., Collingdale, Pa.
SIG	Sigma Instruments, Inc., Boston, Mass.
SYL	Sylvania Electric Products Co., Emporium, Pa.
UTC	United Transformer Co., New York, N. Y.
WL	Ward Leonard Electric Co., Mt. Vernon, N. Y.
WIN	Winchester Electronics, Inc., Lynnbrook, Conn.


POWER OUTPUT, CARRIER UNMODULATED
AEROCOM MIAMI, FLA.
MODEL AT-144 TRANSMITTER
Curves show band coverage (Mc./s.) and (unmodulated) carrier power (watts) into 52 ohm resistive load.
POWER OUTPUT-WATTS
130
120
110
100
90
1 2 3 4 5 6 7 8 (Bands)
1 2 3 4 5 6 7 8 9 10 15 20 100
CARRIER FREQUENCY (Mc./s.)


100
90
80
70
60
50
40
30
20
10
0
(A)
(B)
100
1000
10,000
AUDIO CYCLES PER SECOND
FIDELITY (OVERALL)
MODEL AT-144 TRANSMITTER
RF = 7 MC
AF
(CURVE A - CONSTANT AT LEVEL REQUIRED TO GIVE 100% MODULATION AT "PEAK" FREQUENCY
(CURVE B - CONSTANT LEVEL REQUIRED TO GIVE 50% MODULATION AT "PEAK" FREQUENCY.
AUDIO GAIN - MAXIMUM
AUDIO CLIPPING - MINIMUM
AEROCOM
AT-144 #156



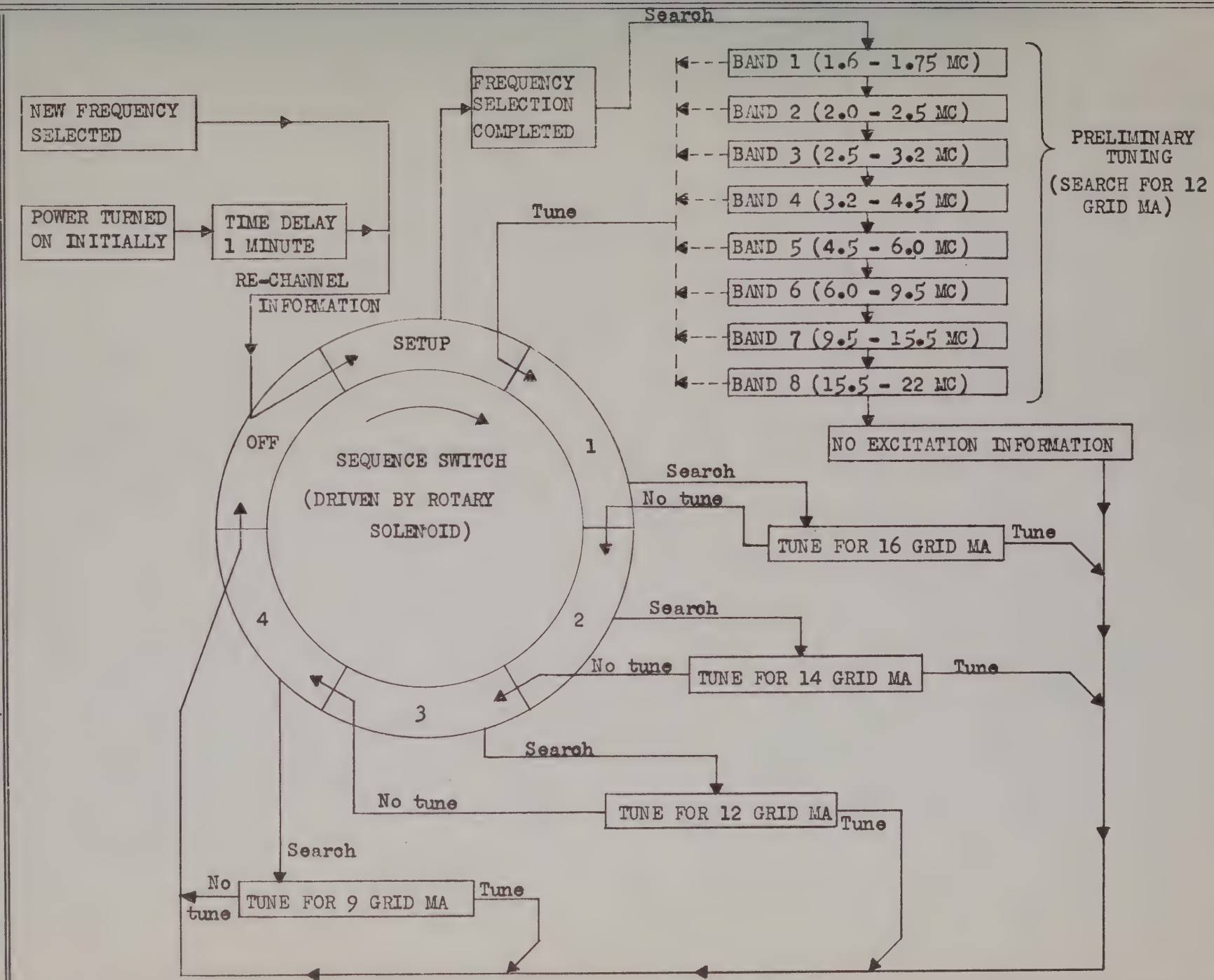
	DESIGN	NAME	DATE
APPROVED			
CHECKED	RDS		5-7-53
DRAWN		FK	5-7-53

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

BLOCK DIAGRAM

SCALE

DWG. NO. AT-144 #151



	Design	Name	Date
Drawn		RK	5-7-53
Checked		DJS	5-7-53
Approved			

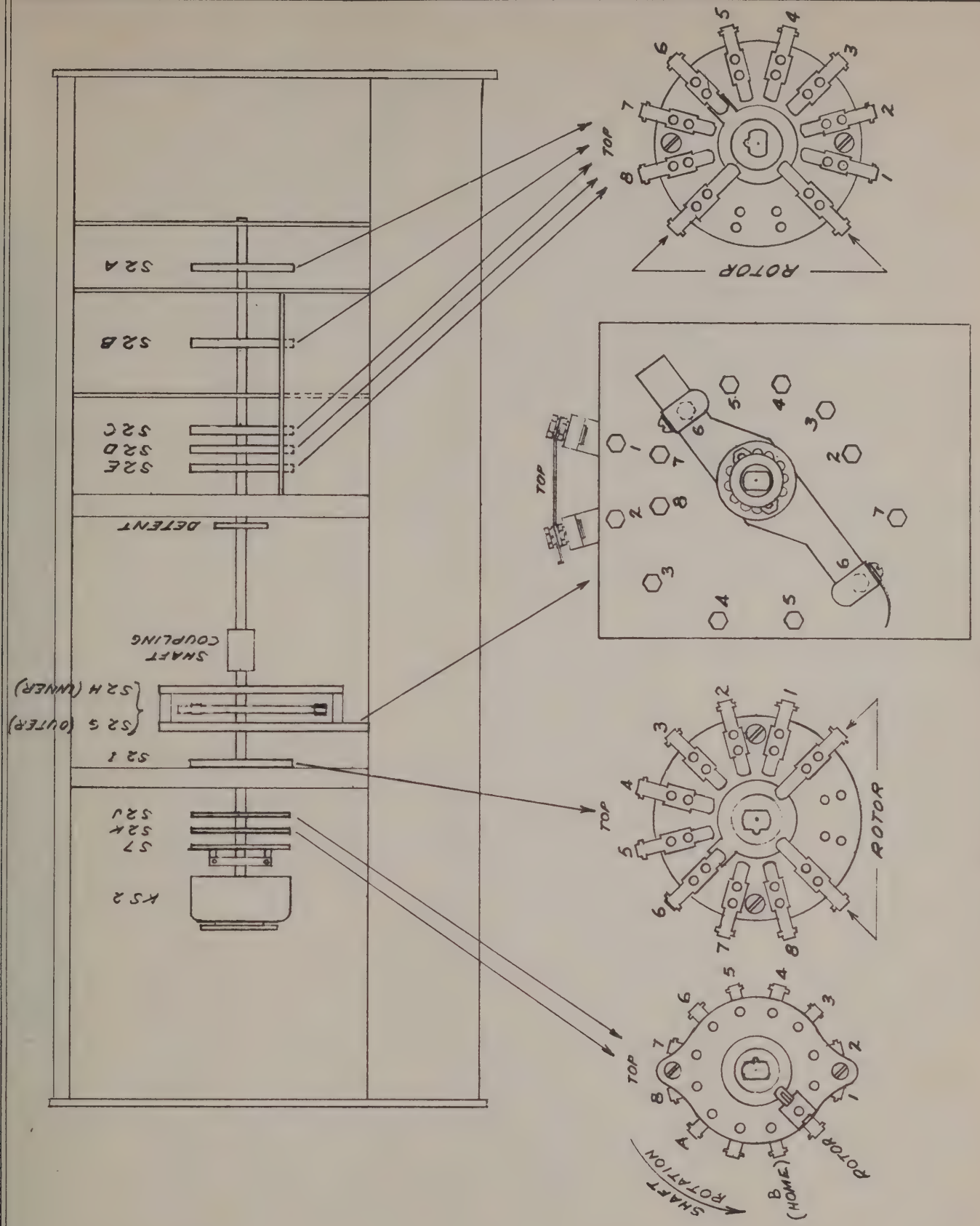
AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

MODEL AT-144 TRANSMITTER

SEQUENCE BLOCK DIAGRAM

Scale

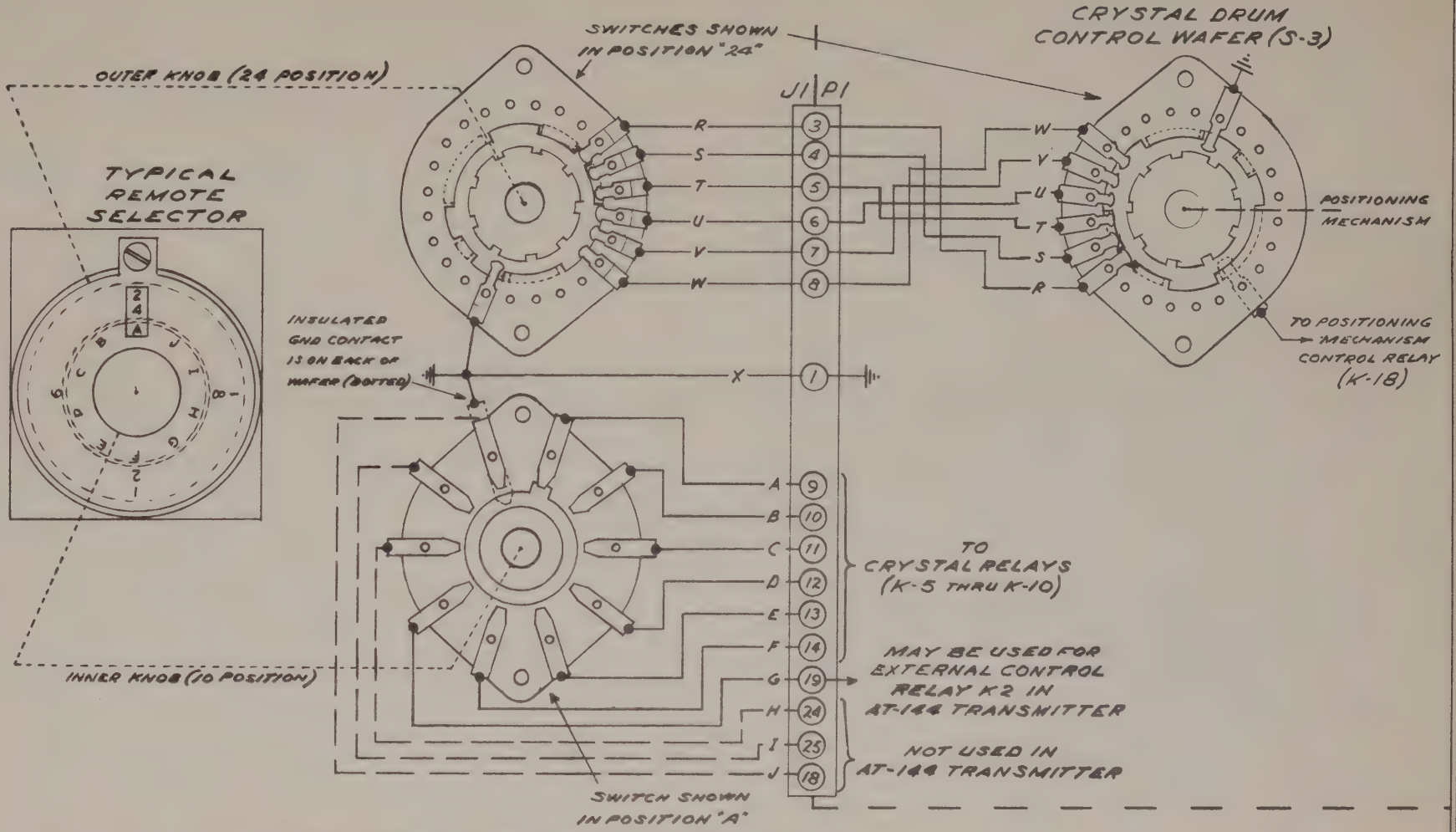
Dwg. No. AT-144 #151 Sheet 2 of 2



DESIGN	NAME	DATE	MODEL AT-144 TRANSMITTER	DWG. NO.
DRAWN	RK	5-2 '53	BANDSWITCH ORIENTATION	AT-144 #169
CHECKED	HDS	5-2-53		SCALE
APPROVED			AERONAUTICAL COMMUNICATIONS EQUIPMENT INC. 3090 DOUGLAS ROAD, MIAMI, FLORIDA	

REMOTE CONTROL
(ARINC CHARACTERISTIC #524, SYSTEM #I)

AT-144 TRANSMITTER



REENTRANT SWITCH COMBINATIONS

POSITION →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CONTACTS ON REENTRANT SWITCH R	O	O	X	X	X	O	O	O	O	X	X	O	X	X	O	O	O	X	X	X	X	O	O	X
S	X	O	O	X	X	X	O	O	O	O	X	X	O	X	X	O	O	O	X	X	X	X	O	O
T	O	X	O	O	X	X	X	O	O	O	O	X	X	O	X	X	O	O	O	X	X	X	X	O
U	O	O	X	O	O	X	X	X	O	O	O	O	X	X	O	X	X	O	O	O	X	X	X	X
V	X	O	O	X	O	O	X	X	X	O	O	O	O	X	X	O	X	X	O	O	O	X	X	X
W	X	X	O	O	X	O	O	X	X	X	O	O	O	O	X	X	O	X	X	O	O	O	X	X

O - DENOTES CONNECTION TO OTHER WIRE OR WIRES
X DENOTES GROUND

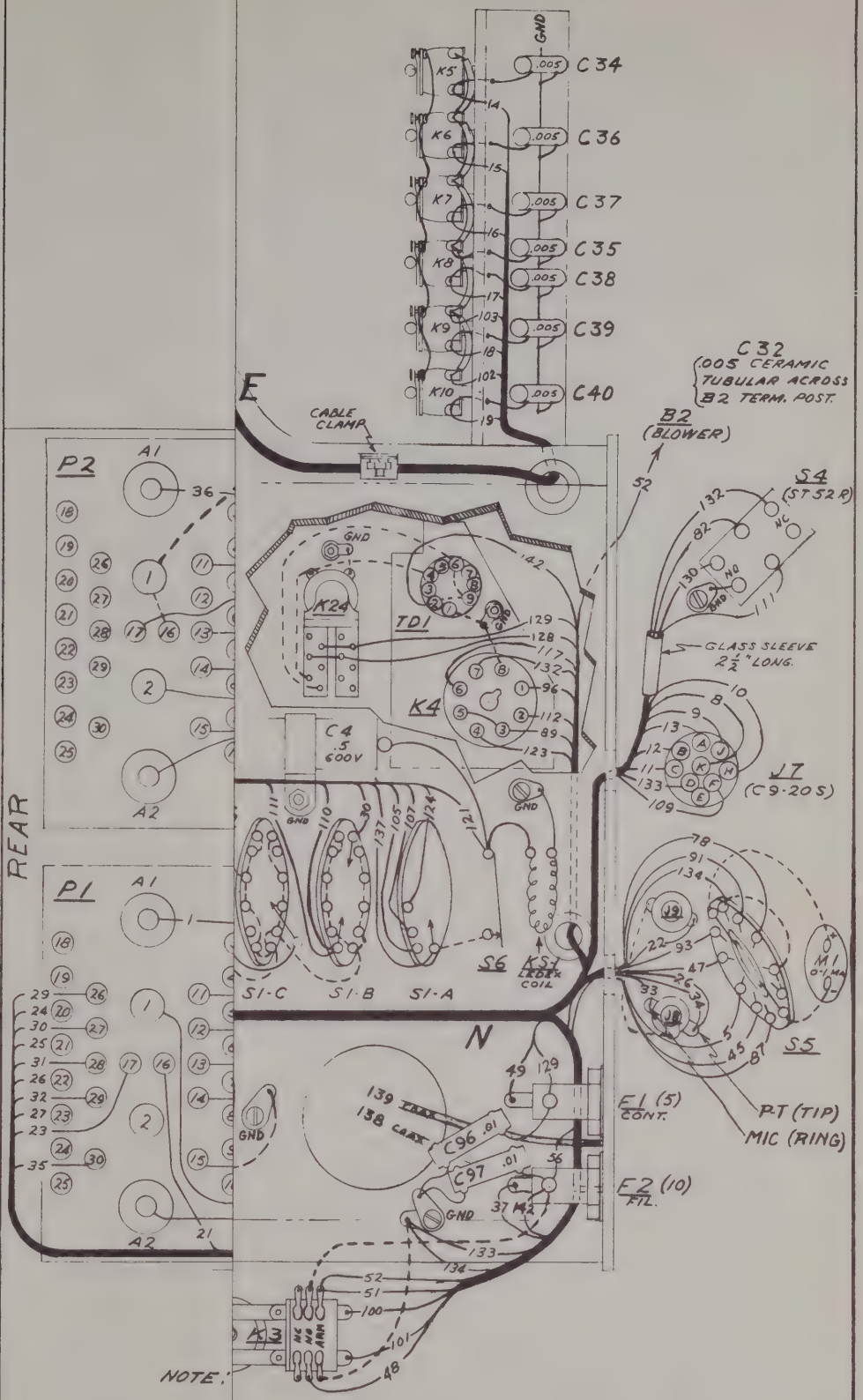
	DESIGN	NAME	DATE
APPROVED			
CHECKED	RDI	RK	4-25-53
DRAWN			4-25-53

MODEL AT-144 TRANSMITTER
TYPICAL REMOTE
FREQUENCY SELECTOR SYSTEM

DWG. No. AT-144 #170

SCALE

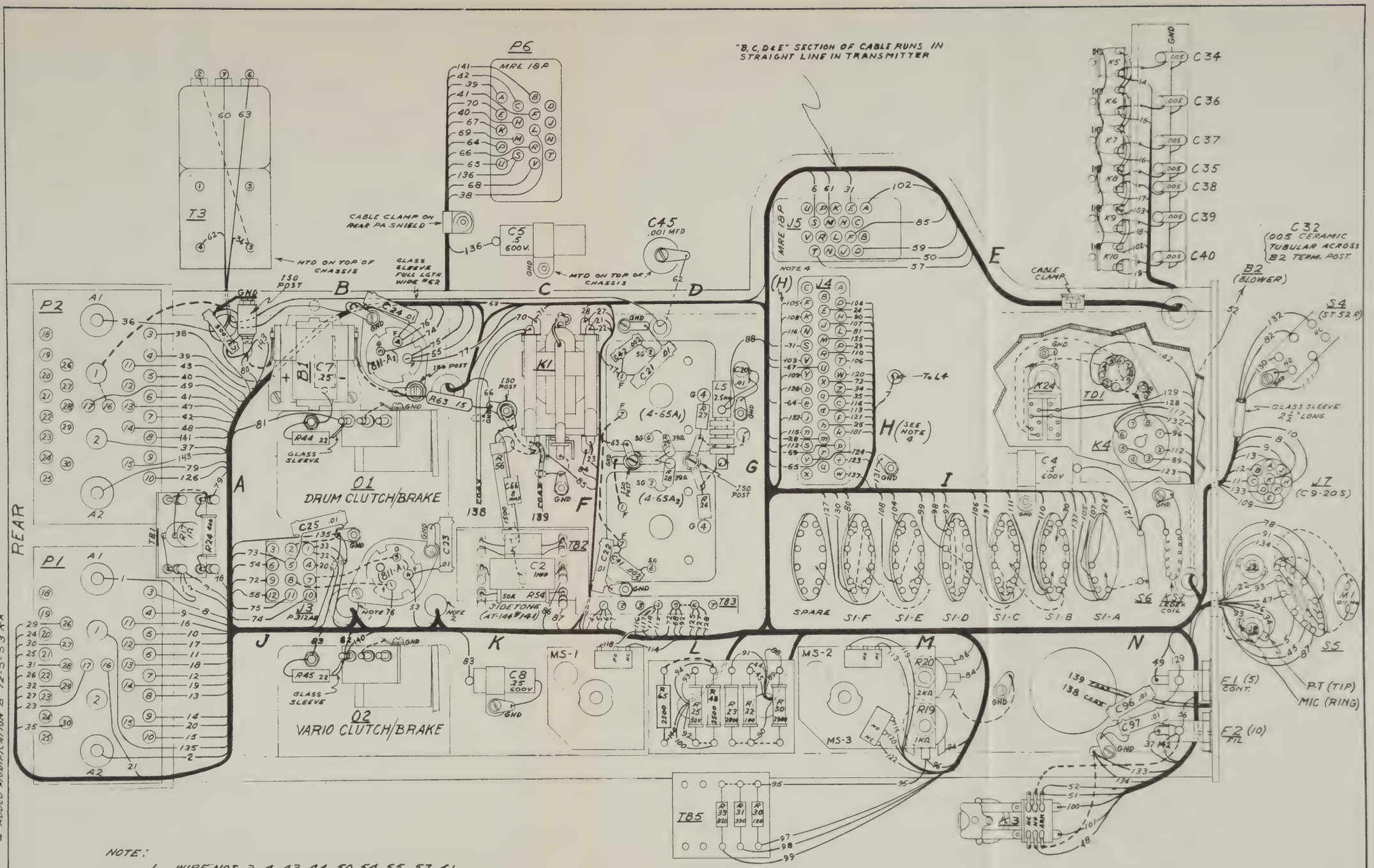
AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA



-2 ADDED WIRE # 141 - P2 TO P6 - 2-25-53 -3 FOR Heater Wire #142 added 9-14-53 JDS -5 Added wire No 143 9-6-56
-1 Added R&S on TB4 2-12-54 JDS -4 ADDED MODIFICATION "B" 12-5-53 RK

AT-144 #154
AT-144 #148, #149 & #150
T & WIRING AT-144 #140
FIER ASSEMBLY AT-144 #141

DATE	MAIN CHASSIS WIRING DIAGRAM	DWG. NO AT-144 #147-5
10-53		SCALE ¾" = 1" APPROX.
-15-53		
	AERONAUTICAL COMMUNICATIONS EQUIPMENT INC. 3090 DOUGLAS ROAD, MIAMI, FLORIDA	



NOTE:

1. WIRE NOS. 3, 4, 43, 44, 50, 54, 55, 57, 61 THRU GROMMET, SEE DWG. NO. AT-144*140 FOR TERMINATIONS.
2. WIRE NOS. 51, 53, 56, 58, 59, 60 THRU GROMMET, SEE DWG. NO. AT-144*140 FOR TERMINATIONS.
3. DOTTED LINES ARE "JUMPERS" - NO WIRE NOS. SEE LIST ON AT-144*154
4. FOR CLARITY "H" SECTION OF CABLE IS SHOWN IN TWO PARTS; IN ACTUAL WIRING THESE FORM A SINGLE CABLE.

REFER.

WIRE LIST AT-144*154
SCHEMATICS AT-144*148, *149 & *150
RESISTOR LAYOUT & WIRING AT-144*140
SIDETONE RECTIFIER ASSEMBLY AT-144*141

	NAME	DATE
DESIGN		
DRAWN	RK	1-10-53
CHECKED	WHE	1-15-53
APPROVED		

MAIN CHASSIS WIRING DIAGRAM

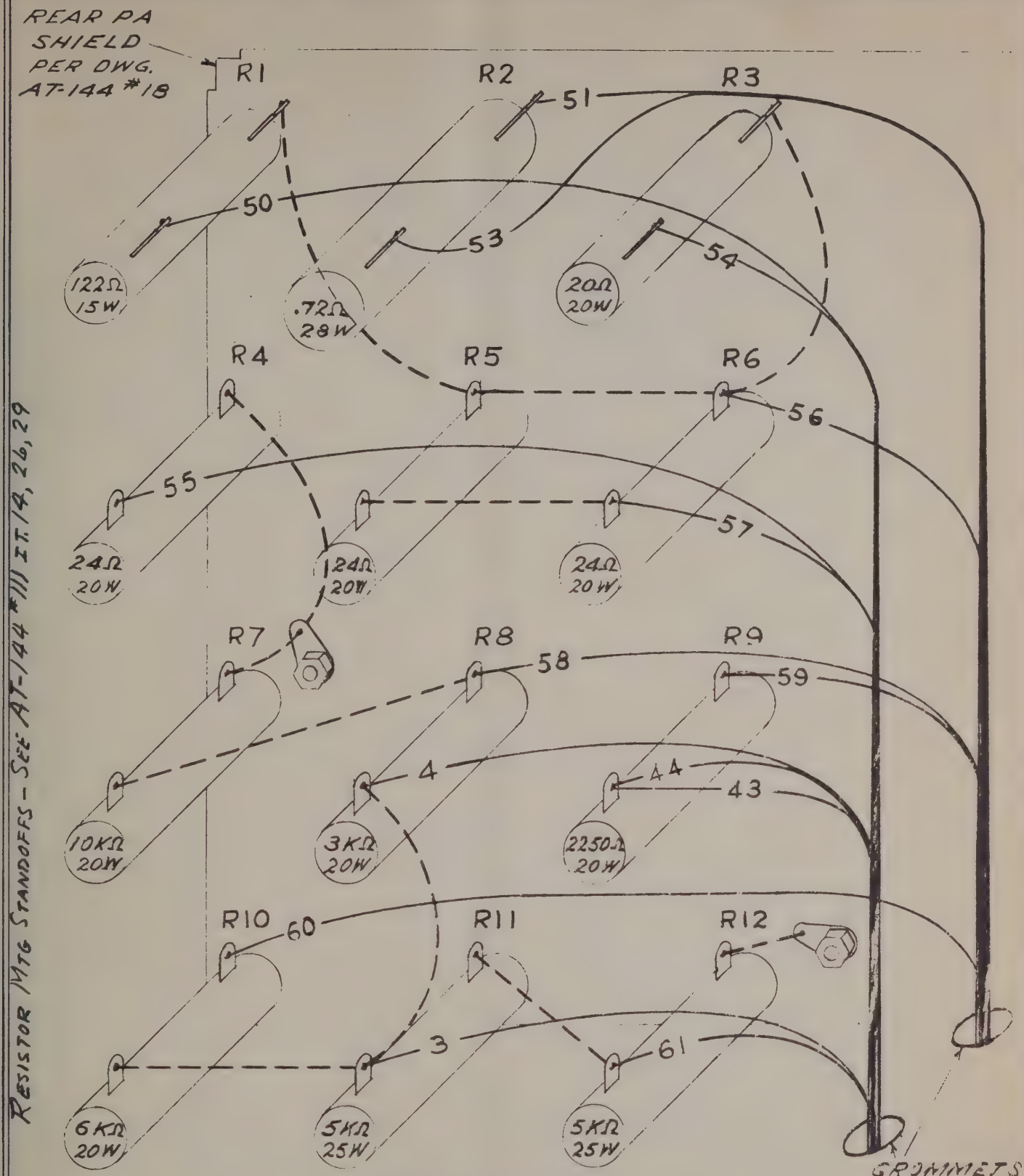
DWG. NO. AT-144*147-5

SCALE ¾" = 1" APPROX.

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3080 DOUGLAS ROAD, MIAMI, FLORIDA

SPEED - 2 M

-1 ADDED WIRE # 141 - P6 TO P6 - 2-25-53
-2 ADDED WIRE #142 added 9-14-53 WDE
-3 TDI Heater wire #142 added 9-14-53 WDE
-4 ADDED MODIFICATION 'B' 12-5-53 RK
-5 Added wire No 143 9-6-54
-1 Added R&S on TB4 1-12-54 RK



REAR VIEW

JUMPERS SHOWN WITH DASHED LINES.

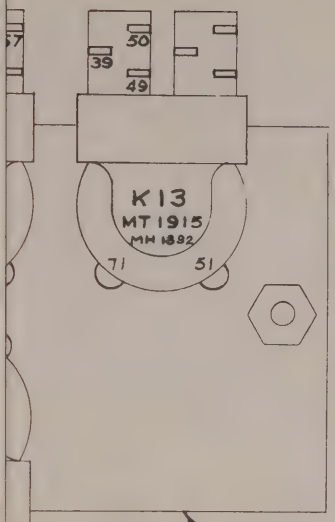
DESIGN	NAME	DATE
DRAWN	RK	12-10 '52
CHECKED	WHE	12-10 '52
APPROVED		

REAR PA SHIELD RESISTOR LAYOUT AND WIRING

DWG. No. AT-144 #140

SCALE NONE

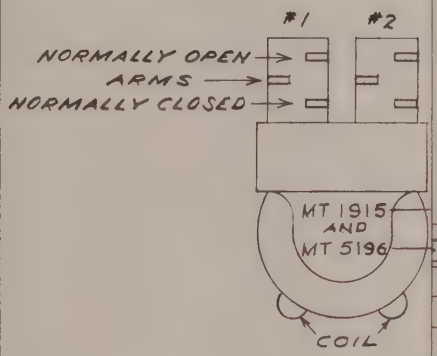
AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

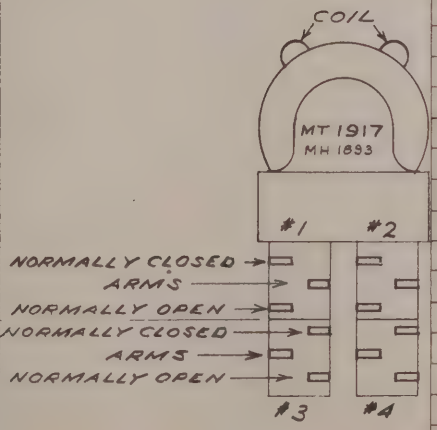


PLUG
WINCHESTER MRE 41S

RELAY MOUNTING PLATE
PER DWG. AT-144 #24

RELAY GUARD STRIPS
PER DWG. AT-144 #94



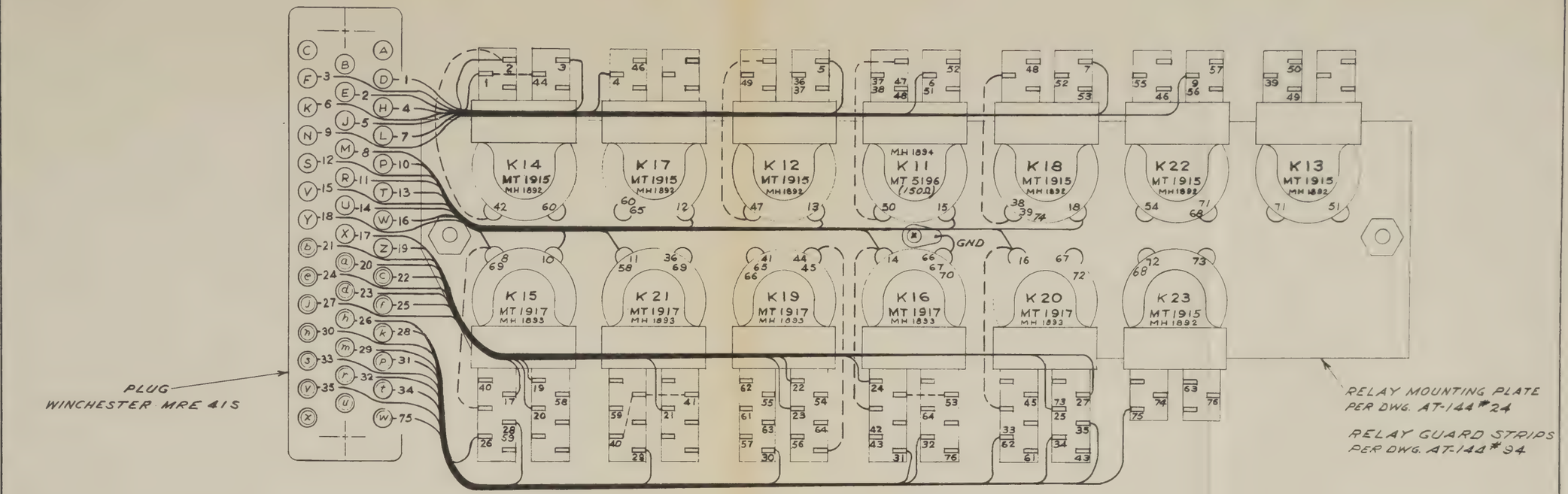


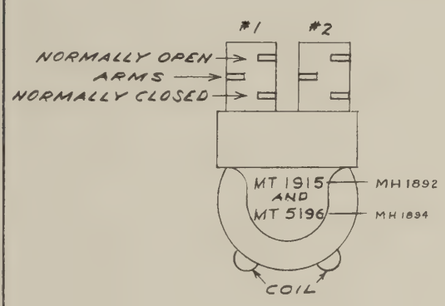
LENGTH	WIRE Nº	FROM	TO	LENGTH
	61	K19 (NO 1)	K20 (NO 3)	
	62	K19 (NC 1)	K20 (ARM 3)	
	63	K19 (NC 3)	K23 (NC 2)	
	64	K19 (NC 4)	K16 (NO 2)	
	65	K17 (COIL)	K19 (COIL)	
	66	K19 (COIL)	K16 (COIL)	
	67	K16 (COIL)	K20 (COIL)	
	68	K23 (COIL)	K22 (COIL)	
	69	K15 (COIL)	K21 (COIL)	
	70	K16 (COIL)	GND STUD	
	71	K22 (COIL)	K13 (COIL)	
	72	K23 (COIL)	K20 (COIL)	
	73	K20 (NO 2)	K23 (COIL)	
	74	K18 (COIL)	K23 (ARM 1)	
	75	PLUG (W)	K23 (NO 1)	
	76	K16 (NO 4)	K23 (ARM 2)	

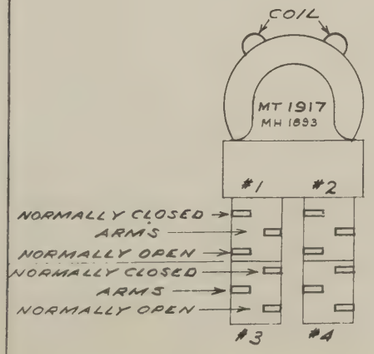
CORRECTED RELAY PART NOS. 3-24-53-CB
-1 K16 (NO 4) WAS 63; K23 (NC 2) & (ARM 2) WERE BLANK; ADDED WIRE Nº 76 6-20-53 RK

23 OL RELAY ASSEMBLY RING DIAGRAM	DWG. NO. AT-144 #138-1 SCALE 1" = 2" (APPROX.)

NAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA







JUMPERS SHOWN WITH DASHED LINES AND CARRY NO WIRE Nos.

ALL WIRE: REX NON STRIP FJR #22

WIRE No	FROM	TO	LENGTH	WIRE No	FROM	TO	LENGTH	WIRE No	FROM	TO	LENGTH	WIRE No	FROM	TO	LENGTH
1	PLUG D	K14 (ARMS 1&2)		21	PLUG b	K21 (NO2)		41	K21 (ARM 2)	K19 (COIL)		61	K19 (NO1)	K20 (NO3)	
2	PLUG E	K14 (NO1)		22	PLUG c	K19 (NC2)		42	K14 (COIL)	K16 (ARM 3)		62	K19 (NC1)	K20 (ARM 3)	
3	PLUG F	K14 (NO2)		23	PLUG a	K19 (NO2)		43	K16 (ARM 3)	K20 (NO4)		63	K19 (NC3)	K23 (NC 2)	
4	PLUG H	K17 (ARM 1)		24	PLUG e	K16 (NC1)		44	K14 (ARM 2)	K19 (COIL)		64	K19 (NC4)	K16 (NO2)	
5	PLUG J	K12 (NO2)		25	PLUG f	K20 (NO2)		45	K19 (COIL)	K20 (ARM 1)		65	K17 (COIL)	K19 (COIL)	
6	PLUG K	K11 (ARM 2)		26	PLUG h	K15 (ARM 3)		46	K17 (NO1)	K22 (NC 1)		66	K19 (COIL)	K16 (COIL)	
7	PLUG L	K18 (NO2)		27	PLUG j	K20 (ARM 2)		47	K12 (COIL)	K11 (NC 1)		67	K16 (COIL)	K20 (COIL)	
8	PLUG M	K15 (COIL)		28	PLUG k	K15 (NC 3)		48	K11 (NC 1)	K18 (NO1)		68	K23 (COIL)	K22 (COIL)	
9	PLUG N	K22 (ARM 2)		29	PLUG m	K21 (NO 3)		49	K12 (ARM 1)	K13 (NC 1)		69	K15 (COIL)	K21 (COIL)	
10	PLUG P	K15 (COIL)		30	PLUG n	K19 (NO 3)		50	K11 (COIL)	K13 (NO1)		70	K16 (COIL)	GND STUD	
11	PLUG R	K21 (COIL)		31	PLUG p	K16 (NO 3)		51	K11 (ARM 2)	K13 (COIL)		71	K22 (COIL)	K13 (COIL)	
12	PLUG S	K17 (COIL)		32	PLUG r	K16 (ARM 4)		52	K11 (NO2)	K18 (ARM 2)		72	K23 (COIL)	K20 (COIL)	
13	PLUG T	K12 (COIL)		33	PLUG s	K20 (ARM 3)		53	K18 (NC 2)	K16 (ARMS 1&2)		73	K20 (NO2)	K23 (COIL)	
14	PLUG U	K16 (COIL)		34	PLUG t	K20 (ARM 4)		54	K22 (COIL)	K19 (ARM 2)		74	K18 (COIL)	K23 (ARM 1)	
15	PLUG V	K11 (COIL)		35	PLUG v	K20 (NC 4)		55	K22 (ARM 1)	K19 (ARM 1)		75	PLUG w	K23 (NO1)	
16	PLUG W	K20 (COIL)		36	K21 (COIL)	K12 (ARM 2)		56	K22 (ARM 2)	K19 (ARM 4)		76	K16 (NO 4)	K23 (ARM 2)	
17	PLUG X	K15 (ARM 1)		37	K12 (ARM 2)	K11 (ARM 1)		57	K22 (NO2)	K19 (ARM 3)					
18	PLUG Y	K18 (COIL)		38	K11 (ARM 1)	K18 (COIL)		58	K15 (ARM 2)	K21 (COIL)					
19	PLUG Z	K15 (NC2)		39	K18 (COIL)	K13 (ARM 1)		59	K15 (NC3)	K21 (NO 1)					
20	PLUG a	K15 (NO2)		40	K15 (NC 1)	K21 (ARM 3)		60	K17 (COIL)	K14 (COIL)					

	NAME	DATE
DESIGN		
DRAWN	RK	12-10-52
CHECKED	WHC	12-10-52
APPROVED		

23
CONTROL RELAY ASSEMBLY
WIRING DIAGRAM

DWG. NO. AT-144 #138-1

SCALE 1"=2" (APPROX.)

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA

CORRECTED RELAY PART NOS. 3-24-53-CB
-1 K16 (NO 4) WAS 63; K23 (NC 2) & (ARM 2) WERE BLANK; ADDED WIRE No 76 6-20-53 RK

WIRE LIST

WIRE NO.	FROM	TO	TYPE & SIZE *	LENGTH	ROUTE **
1	P1 #A1	TB1 (R17)	Ho 20	5-1/2	A
2	P1 #A2	" "	"	6-1/2	A
3	TB1(R17)	R11	"	9	AJ
4	R8	TB3 #1	"	13-1/2	K
5	TB3 #1	S5 (Pos 3+)	"	18	LMN
6	" #1	J5 #6	"	15-1/2	LG
7	" #1	L4	"	18	LH
8	P1 #3	J7 #K	FJR 22	24	JKLMN
9	P1 #4	J7 #J	"	23	"
10	P1 #5	" #H	"	22-1/2	"
11	" #6	" #C	"	22-1/2	"
12	" #7	" #B	"	22-1/2	"
13	" #8	" #A	"	22-1/2	"
14	" #9	K5	"	33-1/2	JKLGE
15	" #10	K6	"	31-1/2	"
16	" #11	K7	"	29-1/2	"
17	" #12	K8	"	30-1/2	"
18	" #13	K9	"	29	"
19	" #14	K10	"	28-1/2	"
20	"#15	J3 #4	Ho 22 in shield braid	5	J in same braid with wire #32
21	" #16	K1 (ARM)	Ho 20	16	JKF
22	K1 (ARM)	J9	Ho 20	22-1/2	FLMN
23	P1 #17	K1 (NC)	Ho 20	13	JKF
24	" #20	J4 #E	FJR 22	19-1/2	JKLH
25	" #21	" (h)	FJR 22	17-1/2	"
26	" #22	J8	"	23	JKLMN
27	" #23	K1 (Coil)	"	16	JKF
28	K1 (Coil)	J4 (m)	"	8-1/2	DG
29	P1 #26	J4 #P	"	18	JKLH
30	" #27	S1-B	"	18-1/2	JKLI
31	" #28	J5 #E	"	21	JKLG
32	" #29	J3 #I	Ho 22 in shield braid	5	J in same braid with wire #20
33	J3 #1	J8	"	21	KLMN
34	J8	J4 #Z	FJR 22	16	NMH
35	P1 #30	J4 # (a)	"	18	JKLH
36	P2 #A1	T3 #5	Ho 20	6-1/2	A
37	" #2	F2	Ho 14	26	AJKLMN
38	" #3	P6 #L	FJR 22	16-1/2	AB
39	" #4	" #A	"	16-1/2	AB
40	" #5	" #H	"	16-1/2	"
41	" #6	" #F	"	16-1/2	"
42	" #7	" #C	"	17	"
43	" #11	R9	Ho 20	11-1/2	AJ

WIRE LIST (Continued)

WIRE NO.	FROM	TO	TYPE & SIZE*	LENGTH	ROUTE**
44	R9	TB4 (R22)	Ho 20	15	KL
45	TB4 (R22)	S5 (Pos 4+)	"	14-1/2	MN
46	Not used				
47	P2 #13	S5 (Pos 2+)	Ho 20	27-1/2	AJKLMN
48	" #14	K3 (NO)	FJR 22	29	"
49	" #17	F1	Ho 14	26	"
50	R1	J5 #N	Ho 20	26	KLG
51	R2	K3 (ARM)	Ho 14	25-1/2	KLMN
52	K3 (ARM)	B2	FJR 22	12	
53	R2	$811A_1$#4	Ho 14	11	
54	R3	J3 #6	Ho 20	11	JA
55	R4	$811A_2$#1	"	22-1/2	JAB
56	R6	F2	Ho 14	22-1/2	KLMN
57	R6	J5 #T	Ho 20	23	KLG
58	R8	J3 #12	"	11	JA
59	R9	J5 #D	FJR 22	19	KLG
60	R10	T3 #7	Ho 20	23-1/2	JA
61	R12	J5 #M	"	20-1/2	KLG
62	T3 #4	C45	Ho 20 with Silicone sleeving	24	BCD
63	" #6	R28 & R29	Ho 20	21-1/2	BC
64	P6 #P	J4 #e	FJR 22	19	CDG
65	P6 #U	J4 r	FJR 22	20	"
66	" #R	Gnd	"	10	
67	" #K	J4 #U	"	19-1/2	CDG
68	" #V	TB3 #5	"	28	CDGL
69	" #M	J4 #p	"	20-1/2	CDG
70	" #E	K1 (coil)	"	13	
71	K1 (coil)	J4 #S	"	9-1/2	CDG
72	J3 #9	TB3 #5	"	13	JKL
73	" #5	J4 #X	"	19	JKLH
74	" #10	$811A_2$#3	Ho 20	13	AB
75	" #11	" #1	"	15	"
76	$811A_1$#1	" #4	Ho 14	15-1/2	JAB
77	$811A_2$#1	$4\text{-}65A_1$#1	"	8-1/2	C
78	TB1 (R24)	S5 (Pos 3-)	Ho 20	27	AJKLMN
79	" (R17-R24)	P2 #A2	"	5	A
80	Iso Post	S1-F	FJR-22	23-1/2	AJKLI
81	O1 (coil)	J4 #L	"	24-1/2	AJKLH
82	O2 (coil)	S4 (Arm)	"	23-1/2	KLMN
83	R45 (O2)	C8	"	6	
84	K1 (No)	R20 (Arm)	Ho 20	14	FLM
85	" (No)	J5 #F	FJR 22	11	FD
86	TB2 (C2)	R20	Ho 20	13	FLM
87	" (R38)	S5 (Pos 5+)	"	19-1/2	FLMN
88	L5	TB4 (R50)	FJR 22	13	G

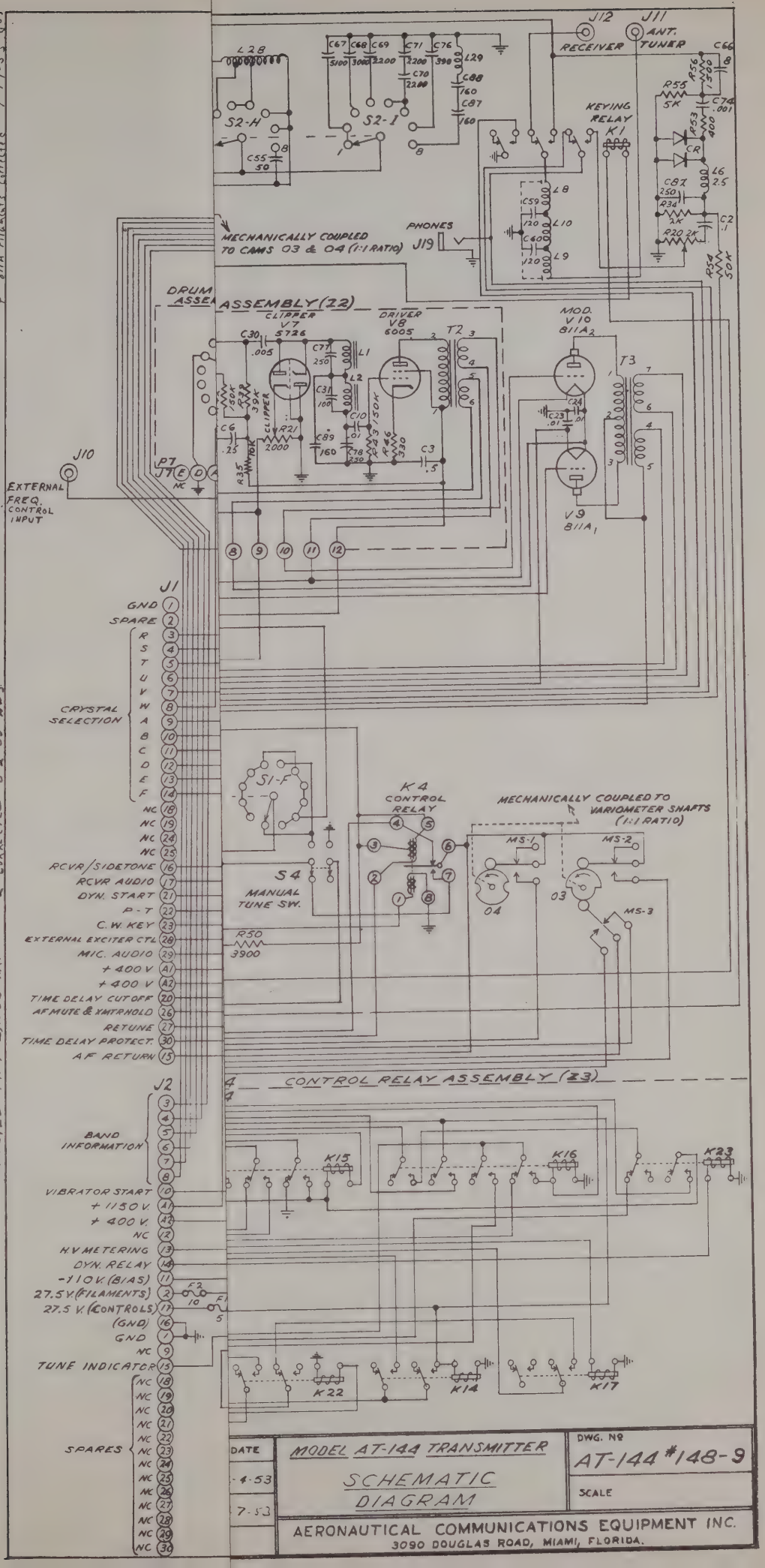
WIRE NO.	FROM	TO	TYPE & SIZE *	LENGTH	ROUTE **
89	TB4 (R50)	K4 #3	FJR 22	14-1/2	MN
90	" (R22,23,50)	J4 #H	"	9	H
91	" (R23)	S5 (Pos 4-)	Ho 20	16	MN
92	" (R25-R48)	TB3 #5	FJR 22	5	L
93	" (R25)	S5 (Pos 1-3	Ho 20	15-1/2	MN
94	" (R48)	R19	FJR 22	11	M
95	R19 (Arm)	TB5 (R30,31,33)	"	5	
96	" "	K4 #1	"	13	N
97	TB5 (R30)	S1-D	"	15-1/2	MI
98	" (R31)	"	"	16	"
99	" (R33)	"	"	17	"
100	K3 (Coil)	TB4 (R25-R48)	"	15	NM
101	" "	J4 k	"	15	NMH
102	J5 #A	Common Coil Connect on K5-K10	"	11-1/2	E
103	J4 #V	" "	"	13-1/2	GE
104	" #D	S1-E	"	7	HI
105	" #F	S1-A	"	10	"
106	" #T	S1-C	"	9-1/2	"
107	" #J	S1-A	"	9-1/2	"
108	" #K	S1-E	"	9	"
109	" #Y	J7 #F	"	17	HMN
110	" #R	S1-B	"	9	HI
111	S1-B	S4 (Arm)	"	21	IMN
112	J4 # a	K4 #2	"	17	HMN
113	" # d	MS2 (No)	"	17	HM
114	" # c	MS1 (No)	"	11	HL
115	" # n	MS3 (Arm)	"	15	HM
116	" #N	TB3 #4	"	11-1/2	HL
117	TB3 #4	K4 #6	"	16-1/2	LMN
118	" #4	MS1 (Arm)	"	6	L
119	TB3 #4	MS2 (Arm)	FJR 22	18	LM
120	J4 #W	MS3 (No)	"	14	HM
121	" # f	S6	"	7	HI
122	" # j	MS3 (No)	"	13	HM
123	" # t	K4 #4	"	16	HMN
124	" # v	S1-A	"	8	HI
125	" #M	TB3 #6	"	10-1/2	HL
126	" # b	P2 #10	"	21	GLKJA
127	S1-F (Arm)	TB3 #6	"	13	IL
128	TB3 #6	K24	"	15	LMN
129	K24	F1	"	7	
130	S1-F (Off)	S4 (No)	"	19-1/2	IMN
131	S1-C	Gnd	"	6	I
132	K4 #7	S4 (No)	"	12	
133	J7 #D	Gnd	"	8	
134	S5 (Pos 5-)	"	Ho 20	11	
135	P1 #1	"	"	5-1/2	
136	C5	P6 #S	FJR 22	8-1/2	
137	J4 # w	S1-A	"	9-1/2	
138	K1 (Arm)	RF Low-Pass Filter	Coax	24	Not in cable

WIRE NO.	FROM	TO	TYPE & SIZE *	LENGTH	ROUTE **
139	K1 (No)	J12	Co-AX	20	Not in cable
140	TB4 (R65)	02 (Coil)	FJR 22	11	LK
141	P2 #8	P6 "B"	FJR 22	16-1/2	B
142	TD1 #2	Fuse (FILS) F2	FJR 22	8	N
143	150 Post	P2 Pin 15	FJR 22	6	A
144					
145					
146					
147					
148					
149					
150					

* FJR 22 - Rex Non-Strip Type FJR Wh. #22 Stranded
Ho 22 - Holyoke Type WL Wh. #22 Stranded
Ho 20 - Holyoke Type WL Wh. #20 Stranded
Ho 14 - Holyoke Type WL Wh. #14 Stranded
20 Tin - Tinned soft copper #20 Solid
14 Tin - Tinned soft copper #14 Solid
Coax - Amphenol RG-29/U 52 ohm cable

** These letters refer to sections of the main cable and are shown on the wiring diagram - see Dwg. AT-144 #147

-5 change TOI Meter ckt. 10-19-53 WDS
-6 ADDED MODIFICATION "B" 12-5-53 RK
-7 Corrected Errors 3-23-55 TR.
R21, R27 Values removed
-4 B11A Filaments corrected 7-14-53 WDS
-3 REVISED K23 WIRING 6-20-53 RK
-2 CORRECTED 6-2-53 WDS
-9 ADDED LEAD FOR TUNE IND. TO J2 PIN 15
-8 ADDED TO-1 BASE DIAGRAM "GV" 1-21-56 RK
1- CORRECTED MAY 12, 1953 TR.



DATE	MODEL AT-144 TRANSMITTER	DWG. NO	AT-144 #148-9
4-53	SCHEMATIC DIAGRAM	SCALE	
7-53			

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA.

-5 change 731 meter ckt. 10-19 52 DWS
-6 ADDED MODIFICATION "B" 12-5-53 RK
-7 Corrected Errors 3-23-55 TR.

R21, R27 Values removed
-4 SIIA filaments corrected 7-14-53 JDL

-3 REVISED K23 WIRING 6-20-53 RK

-2 CORRECTED 6-2-53 JDL

-9 ADDED LEAD FOR TUNE IND. TO J2 PIN 15
-8 ADDED TD-1 BASE DIAGRAM "G-V" 12-56 RK
1- CORRECTED MAY 12, 1953 TR.

BAND SWITCH SOLENOID ASSEMBLY (Z4)

DRUM CONTROL ASSEMBLY (Z5)

RF EXCITER ASSEMBLY (Z1)

AUDIO ASSEMBLY (Z2)

CONTROL RELAY ASSEMBLY (Z3)

MECHANICALLY COUPLED TO CAMS 03 & 04 (1:1 RATIO)

MECHANICALLY COUPLED TO VARIOMETER SHAFTS (1:1 RATIO)

EXTERNAL FREQ. CONTROL INPUT

CRYSTAL SELECTION

RCVR/SIDETONE
RCVR AUDIO
DYN. START
P-T
C.W. KEY
EXTERNAL EXCITER CTL
MIC. AUDIO
+400 V.
+400 V.
TIME DELAY CUT OFF
AF MUTE & XMIT HOLD
RETUNE
TIME DELAY PROTECT.
A.F. RETURN

BAND INFORMATION
VIBRATOR START
+1150 V.
+400 V.
NC
H.V. METERING
DYN. RELAY
-110 V. (BIAS)
27.5 V. (FILAMENTS)
27.5 V. (CONTROLS)
(GND)
GND
NC
TUNE INDICATOR

SPARES

TD-1 TIME DELAY RELAY SOCKET

TD-1 BASE DIAGRAMS

EUREKA TYPE 26.5-60-C

AMPERITE TYPE 26NO60T

G-V TYPE RM-60-SP 26.5 V.DC

DESIGN	NAME	DATE
DRAWN	RK	4-4-53
CHECKED	WDJ	5-7-53
APPROVED		

MODEL AT-144 TRANSMITTER

SCHEMATIC DIAGRAM

DWG. NO AT-144 #148-9

SCALE

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.
3090 DOUGLAS ROAD, MIAMI, FLORIDA.

SPEC 3-2 1/4

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,
3090 S.W. 37TH AVE.,
MIAMI 33, FLORIDA.

Sept. 7,1956

INFORMATION LETTER No. 1

EQUIPMENT: MODEL AT-1144 TRANSMITTER
(CAATC No. 2R3-4)

SUBJECT: Improved PA Tube Retaining Clip
Arrangement.

ENCLOSURE: Drawing AT-1144 #193

In order to improve their retaining action, the PA tube retaining clips have been re-arranged as follows:

1. Retaining clips have been moved from the outside of the PA tube shield rings (located at the base of the PA tubes) to the inside.

2. The PA tube shield rings have been notched at the retaining clip locations to allow the retaining clips to flex during insertion or removal of the PA tubes.

[illegible] together with retaining clips in the new arrangement.

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,

W. H. Epperson,
Chief Engineer

[illegible] of all AT-1144 Instruction Manuals)

FIGURE 1

EXPLODED ASSEMBLY

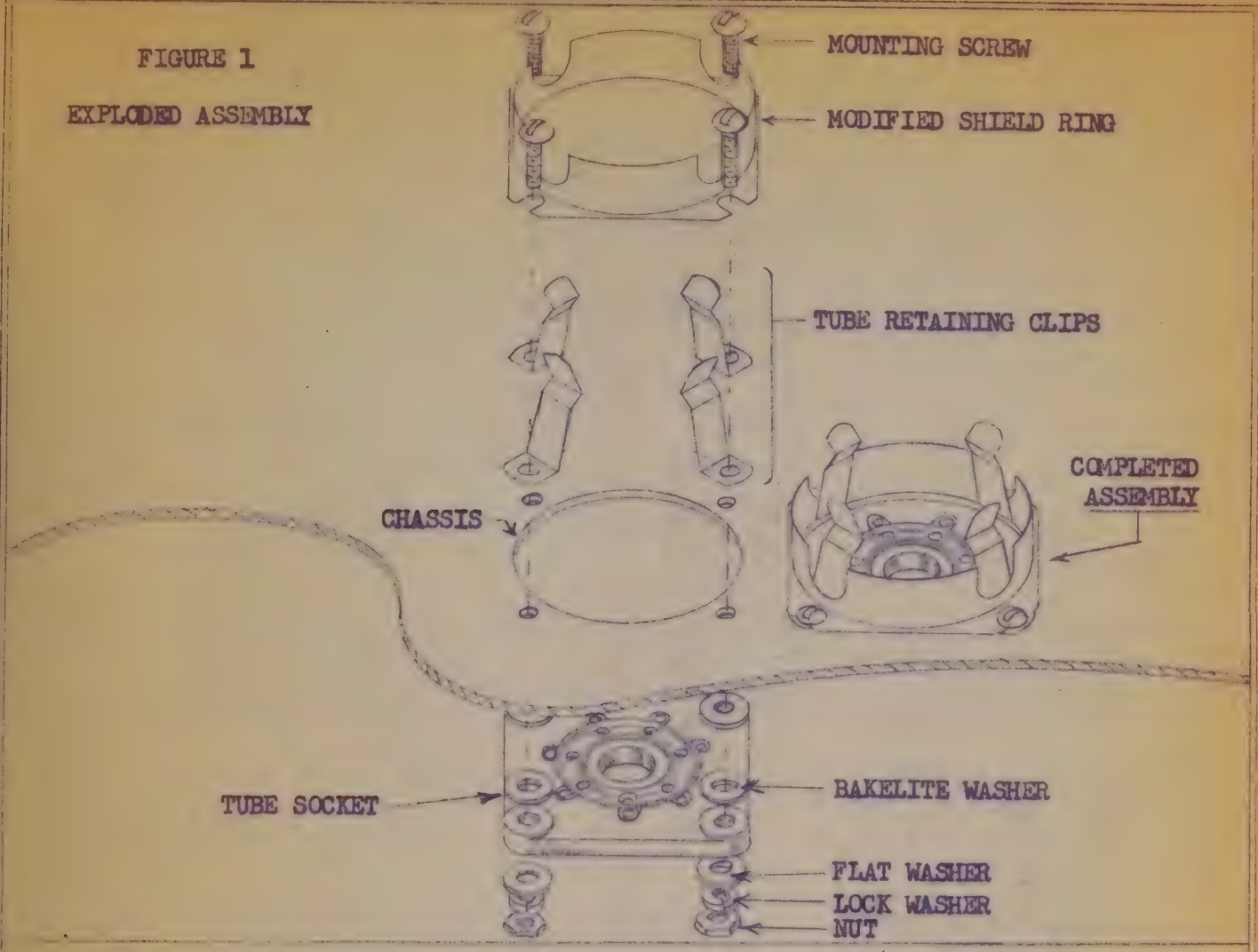
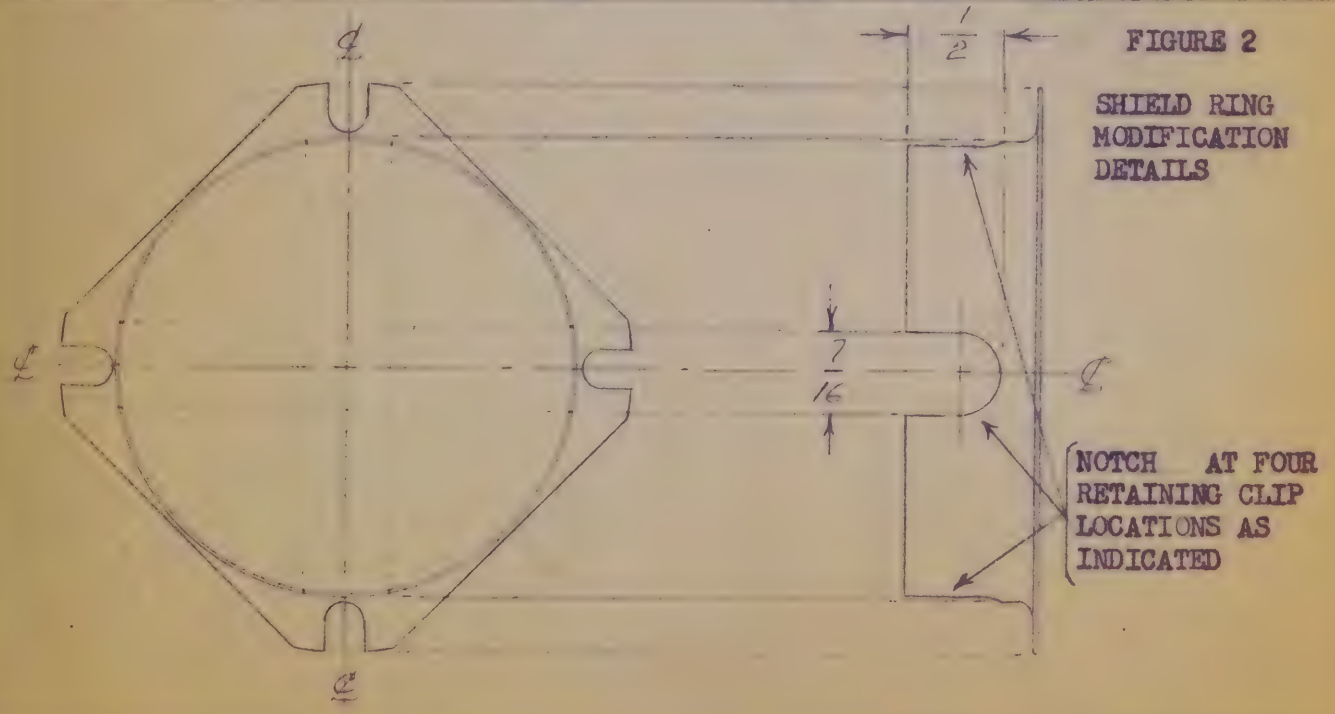


FIGURE 2

SHIELD RING MODIFICATION DETAILS



DESIGN	NAME	DATE
DRAWN	T.D.R.	9-14-56
CHECKED	[illegible]	9 14 56
APPROVED		

AT-1144 TRANSMITTER

INFORMATION LETTER #1 DETAILS

DWG. NO. AT-1144 #193

SCALE

AERONAUTICAL COMMUNICATIONS EQUIPMENT INC.

3090 S. W. 37TH AVE., MIAMI, FLORIDA

3090 S.W. 37TH AVE.,
MIAMI 33, FLORIDA.

Sept. 26,1956

INFORMATION LETTER No. 2.

EQUIPMENT: MODEL AT-144 TRANSMITTER
(CAATC No. 2K3-4)

SUBJECT: PA Grid Tuning Control Relay
(Circuit Symbol K4).

AT-144 PA grid tuning control relay (K4) is currently supplied in Sigma Specification #91576 in place of the originally used Sigma Type 7J0Z-150T. The [illegible] 7J0Z-150T so that no modification is required for using the new relay.

The Spec. #91576 is not hermetically sealed and is therefore considered more reliable than the 7J0Z-150T which is hermetically sealed. The Spec. #91576 has a removable cover which gives access to the contacts for inspection. (CAUTION: Adjustment of the Spec. #91576 contacts is NOT recommended).

[illegible] and therefore should give increased contact life. Results of laboratory tests (in the AT-144) at AEROCOM verify that the Spec. #91576 life is considerably [illegible]

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,

W. H. Epperson,
Chief Engineer

[illegible]

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,
3090 S. W. 37th AVE.,
MIAMI 33, FLORIDA.

Dec. 5,1956

INFORMATION LETTER No. 3.

EQUIPMENT: MODEL AT-11h TRANSMITTER
(CAATC No. 2R3-4)

SUBJECT: Band Switch Solenoid Filter (C5)

In order to provide improved arc suppression in the band switch solenoid (KS2) circuit, filter capacitor C5 has been changed from the previously used .47 mfd 600 WV DC unit to a 1.0 mfd 300 WV DC capacitor. (Astron Corp. catalog #TQ-3-1M or equivalent).

This increased filtering provides a substantial reduction in arcing at one set of contacts on Relay K22, which is used to operate the solenoid for band switching.

Due to other circuit considerations, the sequence solenoid contact filter capacitor, C4, remains 0.47 mfd as before and should not be changed.

The TQ-3-1M capacitor is physically interchangeable with the AQ type previously used.

The AEROCOM part number for the TQ-3-1M capacitor is A-1048. This capacitor may be obtained from AEROCOM priced at $3.30 each.

AERONAUTICAL COMMUNICATIONS EQUIPMENT, INC.,

W.H. Epperson,
Chief Engineer

(This letter to be added in back of all AT-11h Transmitter Instruction Manuals)